CASE NOT YET SCHEDULED FOR ORAL ARGUMENT

CASE NO. 11-1483
Consolidated with Case No. 15-1027

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

INDEPENDENT PILOTS ASSOCIATION,
Petitioner,

v.

FEDERAL AVIATION ADMINISTRATION,
Respondent.

JOINT APPENDIX TO REPLY BRIEF OF PETITIONER INDEPENDENT PILOTS ASSOCIATION

VOLUME III of V
PAGES 1558-2172

Review of the FAA Rule, Flightcrew Member Duty and Rest Requirements,
Docket No. the FAA-2009-1093; Amdt. Nos. 117-1, 119-16, 121-357
issued on December 21, 2011.

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Lynden Air Cargo Comments
ATTACHMENT A
Docket Type: Notice of Proposed Rulemaking (NPRM)
Docket No.: FAA-2009-1093
RIN 2120-AJ58
Document Date: November 15, 2010

NPRM	Comments
SUMMARY	
The FAA is proposing to amend its existing flight, duty and rest regulations applicable to certificate holders and their flightcrew members. The proposal recognizes the growing similarities between the types of operations and the universality of factors that lead to fatigue in most individuals. Fatigue threatens aviation safety because it increases the risk of pilot error that could lead to an accident. The new requirements, if adopted, would eliminate the current distinctions between domestic, flag and supplemental operations. The proposal provides different requirements based on the time of day, whether an individual is acclimated to a new time zone, and the likelihood of being able to sleep under different circumstances.	Lynden Air Cargo (LAC) strongly disagrees with FAA's assertion that there is a "growing similarity" between types of operations. Non-scheduled, all cargo supplemental operations in general and LAC specifically are very different from domestic and flag operations. It is evident that these differences were not taken into account in this proposal.
DATES: Comments are due November 15, 2010	
FOR FURTHER INFORMATION CONTACT: For technical issues: Dale E. Roberts, Air Transportation Division (AFS-200), Flight Standards Service, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone (202) 267-5749; e-mail: dale.e.roberts@faa.gov. For legal issues: Rebecca MacPherson, Office of the Chief Counsel, Regulations Division (AGC-200), 800 Independence Avenue, SW., Washington, DC 20591; telephone (202) 267-3073; e-mail: rebecca.macpherson@faa.gov.	While the FAA has met the burden of Executive Order 12866 by mandating a 60 day comment period, LAC maintains that this period is simply inadequate to read, analyze and respond to the sweeping changes contained in the proposal. This unreasonably short comment period, particularly since it is in conjunction with the Congressionally mandated requirement to establish a "Fatigue Risk Management Plan" (H. R. 5900 sec 212) by October 31, 2010. These redundant requirements unnecessarily burdened the certificate holders directly impacted by both mandates.
SUPPLEMENTARY INFORMATION: Later in this preamble under the Additional Information section, we discuss how you can comment on this proposal and how we will handle your comments. Included in this discussion is related information about the docket, privacy, and the handling of proprietary or confidential business information. We also discuss how you can get a copy of this proposal and related rulemaking documents.	

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Authority for This Rulemaking The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code. This rulemaking is promulgated under the authority described in 49 U.S.C. 44701(a)(5), which requires the Administrator to promulgate regulations and minimum safety standards for other practices, methods, and procedures necessary for safety in air commerce and national security.	
Discussion	
Table of Contents I. Executive Summary II. Background A. Statement of the Problem B. NTSB Recommendations C. International Standards 1. Amendment No. 33 to the International Standards and Recommended Practices, Annex 6 to the Convention on International Civil Aviation, Part I, International Commercial Air Transport--Aeroplanes (ICAO Standards and Recommended Practices (SARP)) 2. United Kingdom Civil Aviation Authority Publication 371 (CAP-371) 3. Annex III, Subpart Q to the Commission of the European Communities Regulation No. 3922/91, as Amended (EU OPS Subpart Q) III. General Discussion of the Proposal A. Applicability B. Joint Responsibility C. Fatigue Training D. Flight Duty Period E. Acclimating to a New Time Zone	

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Executive Summary As discussed in greater detail throughout this document, this rulemaking proposes to establish one set of flight time limitations, duty period limits, and rest requirements for pilots in part 121 operations. The rulemaking aims to ensure that pilots have an opportunity to obtain sufficient rest to perform their duties, with an objective of improving aviation safety. Current part 121 pilot duty and rest times differ by type of operation (domestic, flag, and supplemental I). A general summary of current versus proposed flight time limits, duty time limits, and rest time requirements are included in the table below.	

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Scenario	Rest time		Duty time		Flight time	
	Minimum rest prior to duty – domestic	Minimum rest prior to duty – international	Maximum flight duty time – unaugmented	Maximum flight duty time – augmented	Maximum flight time – unaugmented	Maximum flight time – augmented
Current Part 121	Daily: 8-11 depending on flight time.	Minimum of 8 hours to twice the number of hours flown	16……………..	16-20 depending on crew size.	8………………..	8-16 depending on crew size.
NPRM	9………………..	9……………….	9-13 depending on start time and number of flight segments	12-18 depending on start time, crew size, and aircraft rest facility	8-10 depending on FDP start time	None

A summary of the FAA estimates of the costs and benefits associated with the provisions in this rule can be found in the table below.

	Nominal costs (millions)	PV Costs (millions)
Total Costs (over 10 years) ………………………………………………………………………………..	$1,254.1	$803.5
Benefits	Nominal benefits (millions)	PV benefits (millions)
$6.0 million VSL ……………………………………………………………………………………………….	659.40	463.80
$8.4 million VSL ………………………………………………………………………………………………..	837	589

The FAA began considering changing its existing flight, duty and rest regulations in June 1992, when it announced the tasking of the Aviation Rulemaking Advisory Committee (ARAC) Flightcrew Member Flight/Duty Rest Requirements working group. The tasking followed the FAA's receipt of hundreds of letters about the interpretation of existing rest requirements and several petitions to amend existing regulations. While the working group could not reach consensus, it submitted a final report in June 1994 with proposals from several working group members. Following receipt of the ARAC's report, the FAA published a notice of proposed rulemaking in 1995 (1995 NPRM). The FAA received over 2000 comments to the 1995 NPRM.

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Although some commenters, including the National Transportation Safety Board (NTSB), NASA, Air Line Pilots Association, and Allied Pilots Association, said the proposal would enhance safety, many industry associations opposed the 1995 NPRM, stating the FAA lacked safety data to justify the rulemaking, and industry compliance would impose significant costs. The FAA never finalized the 1995 rulemaking, and on November 23, 2009, the agency withdrew it because it was outdated and raised many significant issues that the agency needed to consider before proceeding with a final rule.	Very little has changed since the 1995 rulemaking; the agency still lacks safety data on non-scheduled all cargo supplemental operations. Indeed, the incidents cited where fatigue is considered a cause were all scheduled operations.
On June 10, 2009, Federal Aviation Administration (FAA) Administrator J. Randolph Babbitt testified before the Senate Committee on Commerce, Science, and Transportation, Subcommittee on Aviation Operations, Safety, and Security on Aviation Safety regarding the FAA's role in the oversight of certificate holders. He addressed issues regarding flightcrew member training and qualifications, flightcrew fatigue, and consistency of safety standards and compliance between air transportation certificate holders. He also committed to assess the safety of the air transportation system and to take appropriate steps to improve it.	
In June 2009, the FAA chartered the Flight and Duty Time Limitations and Rest Requirements Aviation Rulemaking Committee (ARC) comprised of labor, industry, and FAA representatives to develop recommendations for an FAA rule based on current fatigue science and a thorough review of international approaches to the issue. The FAA chartered the ARC to provide a forum for the U.S. aviation community to discuss current approaches to mitigate fatigue found in international standards and make recommendations on how the United States should modify its regulations. The ARC consisted of 18 members representing airline and union associations. The members were selected based on their extensive certificate holder management, direct	

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operational experience, or both.	
Specifically, the FAA asked the ARC to consider and address the following: • A single approach to addressing fatigue that consolidates and replaces existing regulatory requirements for parts 121 and 135. • Generally accepted principles of human physiology, performance, and alertness based on the body of fatigue science. • Information on sources of aviation fatigue. • Current approaches to address fatigue mitigation strategies in international standards. • The incorporation of fatigue risk management systems (FRMS) into a rulemaking. The ARC met over a 6-week period beginning July 7, 2009. Early on, the FAA told the ARC members it was very interested in the ARC's recommendations, but that the agency retained the authority and obligation to evaluate any proposals and independently determine how best to amend the existing regulations. The agency reiterated that participation on the ARC in no way precluded the ARC members from submitting comments critical of the NPRM when it was published. On September 9, 2009, the ARC delivered its final report to the FAA in the form of a draft NPRM. The ARC's goal was to reach as much agreement as possible on the prospective regulation. However, the members recognized early on that they would not be able to reach consensus on all issues. They were, however,	As the results of the ARC clearly indicate, a “single approach” is actually “one size fits all”; the differences between scheduled and non-scheduled all cargo supplemental operations is vast.

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generally successful in agreeing upon broad regulatory approaches and were able to reach consensus on two issues--how to address reserve and the role of commuting in any proposed regulations.	The FAA provides neither scientific nor economic justification for the "single approach" despite objective evidence being provided by the industry groups representing non-scheduled all cargo supplemental operators.
The Cargo Airline Association (CAA) presented a separate proposal for FAA consideration to address the unique operations of its members. According to the CAA, cargo operations are subject to different operational and competitive factors than scheduled passenger air carrier operations, including flight delays and schedule changes outside of the control of the certificate holder. The National Air Carrier Association (NACA) also submitted an alternate proposal to the ARC. NACA proposed that the regulations contained in subpart S to part 121 continue to apply to certificate holders conducting unscheduled supplemental operations. In addition, it proposed to include a requirement that such operators develop and implement FRMS. To assist the ARC with its goal of developing proposed rules to enhance flightcrew member alertness and employ fatigue mitigation strategies, the following experts in sleep, fatigue, and human performance research presented a brief overview of the existing science and studies on sleep and fatigue to the ARC: • Dr. Gregory Belenky, M.D., Sleep and Performance Research Center, Washington State University and Dr. Steven R. Hursh, Ph.D., President, Institutes for Behavior Resources, Professor, Johns Hopkins University School of Medicine presented information on sleep, fatigue, and human performance. • Dr. Thomas Nesthus, Ph.D., FAA Civil Aeromedical Institute (CAMI) presented an overview of the current FAA fatigue studies.	The ARC experts clearly indicated that there were unique requirements for non-scheduled all cargo supplemental carriers. Yet, the facts are not being considered in this rulemaking. Specifically, LAC concurs with the alternate proposal, which provides discrete regulations for different operations. Individual carriers in conjunction with their respective flight crews are the true experts on the role of fatigue in their operations; this should be recognized in this rulemaking.

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• Dr. Peter Demitry, M.D., 4d Enterprises, addressed questions from the ARC but did not make a presentation.	
The ARC members considered the information presented by the scientists as well as other available scientific information and used their substantial operational experience knowledge base to develop the ARC proposals.	
Following their presentations, the scientific experts encouraged the ARC to consider the entire body of scientific studies in developing any proposed limitations and requirements, rather than any one scientific study.	
On August 1, 2010, the President signed the Airline Safety and Federal Aviation Administration Extension Act of 2010, Public Law 111-216 (the Act). In section 212 of the Act, Congress directed the FAA to issue regulations no later than August 1, 2011 to "specify limitations on the hours of flight and duty time allowed for pilots to address problems relating to pilot fatigue."	Lynden Air Cargo appreciates the pressure of Congressional mandates; however, there is no "punishment" for the FAA failing to "issue regulations no later than August 1, 2011". Indeed, the agency's higher duty is to ensure appropriate rulemaking activities under the Administrative Procedure Act. That legislation requires adequate time for substantive comment on the myriad requirements contained in this rule which dramatically change the way a supplemental carrier with vastly different operations than scheduled air carriers must operate.
The Act directed the FAA to consider several factors that could impact pilot alertness including time of day, number of takeoffs and landings, crossing multiple time zones, and the effects of commuting. In addition, the agency was directed to review the available research on fatigue, sleep and rest requirements recommended by the NTSB and NASA, and applicable international standards. Finally, the agency was to explore alternate procedures to facilitate alertness in the cockpit, air carrier scheduling and attendance policies (including sick leave), and medical screening and treatment options.	Key language in the NTSB recommendation included "modify and simplify" the flight crew hours-of service regulations. This proposal has completely ignored the second adverb.
The FAA has developed a proposal for addressing the risk of fatigue on the safety of flight based on an evaluation of the available literature, existing regulatory requirements in both the United States and other countries, and	

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the broad personal, professional experience of the ARC members and FAA staff, as well as the recommendations of the NTSB and NASA. Today's proposal is consistent with the statutory mandate set forth in the Act and takes a new approach whereby the distinctions between domestic, flag, and supplemental operations are eliminated. Rather, all types of operations would take into account the effects of circadian rhythms, inadequate rest opportunities and cumulative fatigue.	
The FAA believes its proposal sufficiently accommodates the vast majority of operations conducted today, while reducing the risk of pilot error from fatigue leading to accidents. In some areas, the FAA proposes to relax current requirements, while in others, it strengthens them to reflect the latest scientific information. The agency proposes to provide credit for fatigue-mitigating strategies, such as sleep facilities, that some certificate holders are currently providing with no regulatory incentive. The agency has also tentatively decided that certain operations conducted under the existing rules are exposing flightcrew members to undue risk.	There is little doubt that the “vast majority” of operations are scheduled; however, this does not remove the fact that many vital operations are not conducted with predetermined route structures and schedules. The “accommodation” for non-scheduled and other *ad hoc* operations is not adequately addressed; broad statements do not change facts.
Today's proposal sets forth a matrix that addresses transient fatigue (i.e., the immediate, short-term fatigue that can be addressed by a recuperative rest opportunity) by establishing a 9-hour minimum rest opportunity prior to commencing duty directly associated with the operation of aircraft (flight duty period, or FDP), placing restrictions on that type of duty, and further placing restrictions on flight time (that period of time when the aircraft is actually in motion--flight time is encompassed by FDP).	The plain language of this summary and of the matrix/regulation makes clear that the agency developed this proposal based solely on operations with a pre-determined schedule.
The proposal provides carriers with a level of flexibility not afforded today by permitting a limited extension of FDP and a limited reduction in the minimum rest opportunity in circumstances that are neither within the carrier's control nor reasonably foreseeable. In order to assure that carriers are adequately	While this summary indicates that there is “flexibility”; ad hoc (non-scheduled) operations are rarely within the air carrier’s control. Indeed, the very phrase “non-scheduled” means that neither the customer nor the carrier knows when the flight will take place. The arbitrary nature of the business makes it

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scheduling flightcrew member's work days, so as not to overuse the extension, carriers would be required to report on both their overall schedule integrity and specific crew-pairing schedule integrity on a bi-monthly basis. Should a carrier fail to meet the required levels of integrity, it would have to adjust its schedule to make it more reliable. The proposal addresses cumulative fatigue by placing weekly and 28-day limits on the amount of time a flightcrew member may be assigned to any type of duty, including FDP. Further 28-day and annual limits are placed on flight time. Flightcrew members would be required to be given at least 30 consecutive hours free from duty on a weekly basis, a 25 percent increase over the current requirements. In addition, today's proposal addresses the impact of changing time zones and flying through the night by reducing the amount of flight time and FDP available for these operations. More flight time and FDP would be available for certificate holders that add additional flightcrew members and provide adequate rest facilities to allow flightcrew members an opportunity to sleep aboard the aircraft. Credit would also be available to certificate holders that provide sufficient ground-based rest facilities. All carriers would have to develop training programs to educate all employees responsible for developing air carrier schedules and safety of flight on the symptoms of fatigue, as well as the factors leading to fatigue and how to mitigate fatigue-based risk.	improbable and therefore impractical to be able to ensure compliance without objective standards specific to non-scheduled operations.
For those operations that cannot be conducted under the proposed prescriptive requirements, today's proposal also allows a carrier to develop a carrier-specific fatigue risk management system (FRMS). An FAA-approved FRMS would allow a certificate holder to customize its operations based on a	LAC appreciates the ability to develop a unique schedule for its flightcrew; however, the company was unable to find any objective standard for this approach to FTDT management, therefore, the agency must provide specific details and methodologies to ensure consistent application of this approach in order for it to be viable.

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scientifically-validated demonstration of fatigue-mitigating approaches and their impact on a flightcrew member's ability to safely fly an airplane beyond the confines of the proposed rule. Finally, today's proposal provides a limited exception for certain emergency operations or operations conducted under contract with the United States government that cannot otherwise be conducted under the prescriptive requirements proposed here. In order to assure there is no abuse, and that the exception is necessary, the proposal includes a reporting requirement.	
II. Background A. Statement of the Problem Fatigue is characterized by a general lack of alertness and degradation in mental and physical performance. Fatigue manifests in the aviation context not only when pilots fall asleep in the cockpit while cruising, but perhaps more importantly, when they are insufficiently alert during take-off and landing. Reported fatigue-related events have included procedural errors, unstable approaches, lining up with the wrong runway, and landing without clearances. There are three types of fatigue: transient, cumulative, and circadian. Transient fatigue is acute fatigue brought on by extreme sleep restriction or extended hours awake within 1 or 2 days. Cumulative fatigue is fatigue brought on by repeated mild sleep restriction or extended hours awake across a series of days. Circadian fatigue refers to the reduced performance during nighttime hours, particularly during an individual's window of circadian low (WOCL) (typically between 2 a.m. and 6 a.m.). Common symptoms of fatigue include:	Lynden Air Cargo appreciates the issues associated with fatigue as well as other factors associated with alertness and degradation of mental and physical performance. It works tirelessly to ensure it— • Hires individuals capable of knowing and appreciating the responsibilities associated with performing operational duties within the carrier's realm; • Trains its flightcrews with precision and care, with emphasis on being able to perform the unique operations associated with the customer's requirements; and, • Provides the most effective and efficient methods of ensuring flight and duty times and conditions in conjunction with its non-scheduled operations. The safety record of the carrier establishes that it is successful in ensuring its flightcrews are capable of withstanding the rigors of the operations. Indeed, the "safety related" incidents experienced by this carrier have not been associated with fatigue issues. LAC emphasizes that the factors associated with fatigue issues are specific to individuals; this is particularly true for this carrier

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• Measurable reduction in speed and accuracy of performance, • Lapses of attention and vigilance, • Delayed reactions, • Impaired logical reasoning and decision-making, including • a reduced ability to assess risk or appreciate consequences of actions, • Reduced situational awareness, and • Low motivation to perform optional activities. A variety of factors contribute to whether an individual experiences fatigue as well as the severity of that fatigue. The major factors affecting fatigue include: • Time of day. Fatigue is, in part, a function of circadian rhythms. All other factors being equal, fatigue is most likely, and, when present, most severe, between the hours of 2 a.m. and 6 a.m. • Amount of recent sleep. If a person has had significantly less than 8 hours of sleep in the past 24 hours, he or she is more likely to be fatigued. • Time awake. A person who has been continually awake more than 17 hours since his or her last major sleep period is more likely to be fatigued. • Cumulative sleep debt. For the average person, cumulative sleep debt is the difference between the amount of sleep a person has received over the past several days, and the amount of sleep they would have received if they got 8 hours of sleep a night. A person with a cumulative sleep debt of more than 8 hours since his or her last full night of sleep is more likely to be fatigued. • Time on task. The longer a person has continuously been doing a job without a break, the more likely he or she is to be fatigued. • Individual variation. Individuals respond to fatigue factors differently and may become fatigued at different times, and to different degrees of severity, under the same circumstances.	that depends upon flightcrew self-awareness to ensure safety of its many unique operations. This carrier's control of the factors listed in the rulemaking is extremely limited. Notwithstanding any flight and duty time limitations, the individual's responsibility is still the over-riding factor that must be considered in order to ensure safe operations. LAC fails to see how the proposed rule will guarantee the increase in safety the agency asserts. As mentioned before and after this paragraph, the ability of the agency or the carrier to judge the probability of any individual's adjustment to a particular schedule is limited. The number of hours is not directly related to the amount of "rest", which will reduce fatigue.

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There is often interplay between various factors that contribute to fatigue. For example, the performance of a person working night and early morning shifts is impacted by the time of day. Additionally, because of the difficulty in getting normal sleep during other than nighttime hours, such a person is more likely to have a cumulative sleep debt or to not have obtained a full night's sleep within the past 24 hours. Scientific research and experimentation have consistently demonstrated that adequate sleep sustains performance. For most people, 8 hours of sleep in each 24 hours sustains performance indefinitely. Sleep opportunities during the WOCL are preferable, although some research indicates that the total amount of sleep is more important than the timing of the sleep. Within limits, shortened periods of nighttime sleep may be nearly as beneficial as a consolidated sleep period when augmented by additional sleep periods, such as naps before evening departures, during flights with augmented flightcrews, and during layovers. Sleep should not be fragmented with interruptions. In addition, environmental conditions, such as temperature, noise, and turbulence, impact how beneficial sleep is and how performance is restored. When a person has accumulated a sleep debt, recovery sleep is necessary to fully restore the person's ``sleep reservoir.'' Recovery sleep should include at least one physiological night, that is, one sleep period during nighttime hours in the time zone in which the individual is acclimated. The average person requires in excess of 9 hours of sleep a night to recover from a sleep debt.	The research assumes that the person is actually sleeping or will sleep during the stated “rest” period; this factor is beyond the control of the researchers, the agency and the carrier.
Several aviation-specific work schedule factors can affect sleep and subsequent alertness. These include early start times, extended work periods, insufficient time off between work periods, insufficient recovery	These factors are not unique to aviation; indeed, under current regulations they are taken into account.

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time off between consecutive work periods, amount of work time within a shift or duty period, number of consecutive work periods, night work through one's window of circadian low, daytime sleep periods, and day-to-night or night-to-day transitions. The FAA believes its current regulations do not adequately address the risk of fatigue. Presently, flightcrew members are effectively allowed to work up to 16 hours a day, with all of that time spent on tasks directly related to aircraft operations. The regulatory requirement for 9 hours of rest is regularly reduced, with flightcrew members spending rest time traveling to or from hotels and being provided with little to no time to decompress. Additionally, certificate holders regularly exceed the allowable duty periods by conducting flights under part 91 instead of part 121, where the applicable flight, duty and rest requirements are housed. As the NTSB repeatedly notes, the FAA's regulations do not account for the impact of circadian rhythms on alertness, and the entire set of regulations is overly complicated, with a different set of regulations for domestic operations, flag operations, and supplemental operations.	It is a mystery to LAC why the FAA "does not believe" its current regulations are adequate; indeed, the opposite is actually established through the years that the regulations have been in effect. The contention that the rest periods are "regularly reduced" is also not supported by any objective evidence. Even if the regulations accounted for circadian rhythms, there is no method of assessing an individual's reaction or adaptability to any particular schedule. Finally, the contention that the regulations are "overly complicated" is untrue, the current subpart S is simple and effective; indeed, those regulations rely on operations that have been performed rather than a guess as to what might happen. The current rule acknowledges that each non-scheduled operation is different and therefore should be bound by different requirements. It is not justifiable to assume domestic scheduled carriers face the same issues with respect to fatigue as do supplemental non-scheduled carriers, especially those engaged in all cargo operations. This proposal falls far short of the stated NTSB goal of simplifying and clarifying FTDT regulations.
B. NTSB Recommendations The NTSB has long been concerned about the effects of fatigue in the aviation industry. The first aviation safety recommendations, issued in 1972, involved human fatigue, and aviation safety investigations continue to identify serious concerns about the effects of fatigue, sleep, and circadian rhythm disruption. Currently, the NTSB's list of Most Wanted Transportation	The NTSB's role in assessing aviation safety is distinctly unique and definitely different than the role of the FAA. Following recommendations based upon two accidents unrelated to the operations of LAC and other similarly situated non-scheduled, supplemental carriers inexcusably ignores the facts.

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Safety Improvements includes safety recommendations regarding pilot fatigue. These recommendations are based on two accident investigations and an NTSB safety study on commuter airline safety.	
In February 2006 the NTSB issued safety recommendations after a BAE-J3201 operated under part 121 by Corporate Airline struck trees on final approach and crashed short of the runway at Kirksville Regional Airport, Kirksville, Missouri. The captain, first officer, and 11 of the 13 passengers died. The NTSB determined the probable cause of the October 19, 2004 accident was the pilots' failure to follow established procedures and properly conduct a non-precision instrument approach at night in instrument meteorological conditions.	Any NTSB recommendation that is based upon scheduled operations should not be used to justify an agency rulemaking that impacts carriers with unrelated operations. The conclusion that "fatigue likely contributed" to a pilot's inability to follow established procedures in a scheduled operation is a thin justification for imposing a regulation on non-scheduled, supplemental carriers. Indeed, many factors contributed to this particular accident, including non-professional, indeed, inexcusable conduct by the flightcrew.
The NTSB concluded that fatigue likely contributed to the pilots' performance and decision-making ability. This conclusion was based on the less than optimal overnight rest time available to the pilots, the early report time for duty, the number of flight legs, and the demanding conditions encountered during the long duty day.	LAC again emphasizes the fact that the NTSB's recommendation requested the FAA "modify and simplify" the regulations; that has not been achieved by the proposal. The current regulations governing the company's supplemental, non-scheduled operations are simple and achieve the very result that is being contemplated by this proposal.
As a result of the accident, the NTSB issued the following safety recommendations related to flight and duty time limitations: (1) Modify and simplify the flightcrew hours-of-service regulations to consider factors such as length of duty day, starting time, workload, and other factors shown by recent research, scientific evidence, and current industry experience to affect crew alertness (recommendation No. A-06-10); and (2) require all part 121 and part 135 certificate holders to incorporate fatigue-related information similar to the information being developed by the DOT Operator Fatigue Management Program into initial and recurrent pilot training programs. The recommendation notes that this training should address the detrimental effects of fatigue and include strategies for avoiding fatigue and	The NTSB recommendation that the new rules cover "all part 121 and part 135 certificate holders" was based upon a false premise, i.e., that such operations are "the same". Indeed, the NTSB did not address the unique requirements of the non-scheduled operator and the safety record of these operations relative to the question of flightcrew fatigue.

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countering its effects (recommendation No. A-06-10). The NTSB's list of Most Wanted Transportation Safety Improvements also includes a safety recommendation on pilot fatigue and ferry flights conducted under 14 CFR part 91. Three flightcrew members died after a Douglas DC-8-63 operated by Air Transport International was destroyed by ground impact and fire during an attempted three-engine takeoff at Kansas City International Airport in Kansas City, Missouri. The NTSB noted that the flightcrew conducted the flight as a maintenance ferry flight under part 91 after a shortened rest break following a demanding round trip flight to Europe that crossed multiple time zones. The NTSB further noted that the international flight, conducted under part 121, involved multiple legs flown at night following daytime rest periods that caused the flightcrew to experience circadian rhythm disruption. In addition, the NTSB found the captain's last rest period before the accident was repeatedly interrupted by the certificate holder. In issuing its 1995 recommendations, the NTSB stated that the flight time limits and rest requirements under part 121 that applied to the flightcrew before the ferry flight did not apply to the ferry flight operated under part 91. As a result, the regulations permitted a substantially reduced flightcrew rest period for the nonrevenue ferry flight. As a result of the investigation, the NTSB reiterated earlier recommendations to (1) finalize the review of current flight and duty time limitations to ensure the limitations consider research findings in fatigue and sleep issues and (2) prohibit certificate holders from assigning a flightcrew to flights conducted under part 91 unless the flightcrew met the flight and duty time limits under part 121 or other applicable regulations (recommendation No. A-95-113). In addition to recommending a comprehensive approach to fatigue with flight	

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duty limits based on fatigue research, circadian rhythms, and sleep and rest requirements, the NTSB has also stated that FRMS may hold promise as an approach to dealing with fatigue in the aviation environment. However, the NTSB noted that it considers fatigue management plans to be a complement to, not a substitute for, regulations to address fatigue.	
C. International Standards There are a number of standards addressing flight and duty time limitations and rest requirements that have been adopted by other jurisdictions, as well as the International Civil Aviation Organization (ICAO), and these standards were reviewed by the ARC to determine if any of their philosophy or structures could be adopted by the FAA. While the ARC found many of the requirements useful, it also determined that the U.S. requirements would need to address the U.S. aviation industry and that the existing standards could not fully achieve that objective. The FAA agrees that none of the existing standards fully address the U.S. aviation environment. Nevertheless, the existing standards do serve as the basis of many of the provisions proposed today. Accordingly, specific provisions of these standards are discussed throughout the rest of this document and a copy of each standard has been placed in the docket. 1. Amendment No. 33 to the International Standards and Recommended Practices, Annex 6 to the Convention on International Civil Aviation, Part I, International Commercial Air Transport--Aeroplanes (ICAO Standards and Recommended Practices (SARP))The ICAO SARP for Contracting States (States) provide that a certificate holder should establish flight time and duty period limitations and rest provisions that enable the certificate holder to manage the fatigue of its flightcrew members. The ICAO SARP do not provide specific numerical values for these provisions	The United States has many unique legal, technical and factual issues that cannot be based upon or justified by “international standards”. The fact that the agency “agrees that none of the existing standards fully address the U.S. aviation environment” flies in the face of using those same standards as the basis for its sweeping regulatory change.

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but set forth a regulatory framework for member States to use as guidelines in establishing prescriptive limitations for fatigue management. Member States are required to base their regulations on scientific principles and knowledge with the goal of ensuring that flightcrew members perform at an adequate level of alertness for safe flight operations. The ICAO SARP do not address fatigue risk management programs currently; however, these programs are currently under development. 2. United Kingdom Civil Aviation Authority Publication 371 (CAP-371) Air Navigation Order 2000, Part VI, as amended, requires a certificate holder to have a civil aviation authority-approved scheme for regulating the flight time of aircrews. CAP-371 provides guidance on this requirement and recognizes that the prime objective of a flight limitation scheme is to ensure flightcrew members are adequately rested at the beginning of each Flight Duty Period (FDP) and are flying sufficiently free from fatigue so they can operate efficiently and safely in normal and abnormal situations. When establishing maximum FDPs and minimum rest periods, certificate holders must consider the relationship between the frequency and patterns of scheduled FDPs and rest periods, and the effects of working long hours with minimum rest. 3. Annex III, Subpart Q to the Commission of the European Communities Regulation No. 3922/91, as Amended (EU OPS subpart Q) EU OPS subpart Q prescribes limitations on FDPs, duty periods, block (flight) time, and rest requirements. Like the previous standards discussed, EU OPS subpart Q recognizes the importance of enabling flightcrew members to be sufficiently free from fatigue so they can operate the aircraft satisfactorily in	

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all circumstances. In establishing flight and duty limitation and rest schemes, EU OPS subpart Q requires certificate holders to consider the relationship between the frequencies and pattern of FDPs and rest periods, and the cumulative effects of long duty hours with interspersed rest. Certificate holders must take action to revise a schedule in cases where the actual operation exceeds the maximum scheduled FDP on more than 33 percent of the flights in that schedule during a specified period.	
III. General Discussion of the Proposal A. Applicability The FAA is proposing to limit this rulemaking to part 121 certificate holders and the flightcrew members who work for them. While fatigue is a universal problem that applies to all types of operations and to all safety sensitive functions, the agency has decided to take incremental steps in addressing fatigue. Thus, future rulemaking initiatives may address fatigue concerns related to flight attendants, maintenance personnel, and dispatchers. In addition, part 135 certificate holders should pay close attention to both this NPRM and any final rule. This is because part 135 operations are very similar to those conducted under part 121, particularly part 121 supplemental operations. The FAA does not intuitively see any difference in the safety implications between the two types of operations, although it acknowledges there may be less overall risk to the flying public in part 135 operations than part 121 operations. Accordingly, the part 135 community should expect to see an NPRM addressing its operations that looks very similar to, if not exactly like, the final rule the agency anticipates issuing as part of this rulemaking initiative.	Again, the agency is placing all operations into one basket; while there may be justification for changing the rules for scheduled operations, it is not justification for applying dramatically new requirements on all cargo non-scheduled, supplemental operations. There is zero risk to the flying public in maintaining subpart S for non-scheduled, supplemental all cargo airlines; the agency has failed to address these unique operations, although the FAA felt it had to do exactly that when preparing the rules that currently govern these air carriers (i.e., in establishing subpart S).

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Today's proposal applies to all flights conducted by part 121 certificate holders, including flights like ferry flights that are historically conducted under part 91. While these types of flights can continue to operate under the general rules of part 91, the flight, duty, and rest requirements proposed here would also apply.	
In addition, the FAA has tentatively decided against adopting different requirements based on the nature of the operation. The FAA has designed the flight, duty and rest scheme proposed today to enhance flightcrew member alertness and mitigate fatigue. The agency's existing regulatory scheme provides different rules for domestic operations, flag operations, and supplemental operations. This hodgepodge of requirements developed over time to address changing business environments and advances in technology that allowed for longer periods of flight. Thus, in domestic operations, flight time is essentially calculated based on time at the controls, while in supplemental operations, the regulations contemplate restrictions based on ``time aloft'' since a flightcrew member may not be at the controls for the entire flight; crew augmentation is prohibited in domestic operations; and the regulations governing flag operations, where augmentation is largely assumed, allow certificate holders to liberally increase the amount of flight time based on the presence of additional flightcrew members, regardless of whether those individuals can actually fly the airplane.	It is heartening to note that the FAA has "tentatively" decided against adopting different requirements; this uncertainty can be reversed based on the nature of the operation and sufficient research and analysis into the reasons different standards should apply to different operations. Indeed, the FAA has in the past and must now consider the nature of non-scheduled all cargo operations since it is the government's responsibility to ensure its regulations are applicable to different parties based upon facts, not on a desire to force all into a false premise. The proposal is neither practical nor possible to comply with for such operators. Not only is it economically infeasible, it is unnecessary. The current subpart S has established a viable pattern for LAC as well as other similarly situated carriers. This company's case is further complicated by the type of aircraft it operates and the unique nature of non-scheduled operations it performs. It is impossible to reconcile the unique nature of the individual with the demands of this rulemaking. If fatigue reduction is the true purpose of this proposal (rather than a Congressional-mandate), then the individual's ability to adapt to the environment must be taken into consideration to achieve the desired result.
Fatigue factors, however, are universal. The sleep science, while still evolving and subject to individual inclinations, is clear in a few important respects: most people need eight hours of sleep to function effectively, most people find it more difficult to sleep during the day than during the night, resulting in greater fatigue if working at night; the longer one has been awake and the longer one spends on task, the greater the likelihood of fatigue; and fatigue leads to an increased risk of making a mistake.	The FAA is ignoring the fact that it must address different operational requirements; instead it tries to dismiss its obligation by insinuating that it is merely a matter of "different business models". The timing of flights is not the sole issue or even the main issue being ignored; it is scheduled versus non-scheduled requirements. The all cargo, non-scheduled

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The FAA recognizes there are different business models and needs that are partly responsible for the differences in the current regulations. It is sympathetic to concerns raised within the ARC by cargo carriers and carriers engaged in supplemental operations that new regulations will disproportionately impact their business models. However, the FAA also notes that the historical distinction between the types of operators has become blurred. Cargo carriers conduct the vast majority of their operations at night, but passenger carriers also offer ``red eyes'' on a daily basis. Some carriers operate under domestic, flag or supplemental authority, depending on the nature of the specific operation. Additionally, in some instances, the FAA has authorized a carrier to conduct supplemental operations under the flag rules. Today's proposal is designed to recognize the growing similarities between the kinds of operations and the universality of factors that lead to fatigue in most individuals. Thus, the proposal provides different requirements based on the time of day, whether an individual is acclimated to a new time zone, and the likelihood of being able to sleep under different circumstances. If today's proposal is adopted, the FAA expects that most part 121 operators will be required to make changes to their existing operations, and some will need to make more changes than others. However, the FAA also believes that the proposal is sufficiently flexible to accommodate the vast majority of operations conducted today without imposing unreasonable costs.	supplemental air carriers are essential to the economic viability and protection of the nation; to simply state that we are similar to scheduled "red-eyes" ignores the reality of the operations. Ignoring facts does not make them go away, and being "sympathetic" to concerns does not establish a justification for the impact that this proposal will have on subpart S carriers. The proposal will not enhance safety for the non-scheduled supplemental all cargo carrier, although it may put some of them out of business. While it would be convenient for all operations to be alike, the reality is they are not and the FAA cannot ignore that fact without ignoring its responsibility to ensure regulations reflect the realities of the regulated parties. The simple truth is that LAC does not operate in the same manner as scheduled all cargo carriers and therefore faces different crew scheduling and fatigue issues.
B. Joint Responsibility Fatigue mitigation is a joint responsibility of the certificate holder and the flightcrew member. Today's proposal recognizes the need to hold both certificate holders and pilots responsible for making sure flightcrew members are working a reasonable number of hours, getting sufficient sleep,	LAC is encouraged by the agency's recognition of the joint responsibility imposed by the proposal; however, it is unsure about enforcement. If the carrier fulfills its obligations to ensure proper scheduling and the flightcrew member is appropriately chosen and trained, the agency must ensure it enforces the

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and not reporting for flight duty in an unsafe condition. Many of the ways that carriers and flightcrew members will negotiate this joint responsibility will be handled in the context of labor management relations. Others will not. Today's proposal is drafted in a manner that directly imposes the regulatory obligations on both the certificate holders and the flightcrew members. It is unfair to place all the blame for fatigue on the carriers. Pilots who pick up extra hours, moonlight, report to work when sick, commute irresponsibly, or simply choose not to take advantage of the required rest periods are as culpable as carriers who push the envelop [sic] by scheduling right up to the maximum duty limits, assigning flightcrew members who have reached their flight time limits additional flight duties under part 91, and exceeding the maximum flight and duty limits by claiming reasonably foreseeable circumstances are beyond their control.	regulations based upon objective criterion and evidence. This is not made clear by the preamble or the regulations. Indeed, some of the regulatory definitions are particularly subjective in nature, which will create a "s/he said; s/he said" enforcement posture.
One important element of this proposal is that flightcrew members may not accept an assignment that would consist of an FDP if they are too fatigued to fly safely. Likewise a flightcrew member may not continue subsequent flight segments if he or she has become too fatigued to fly safely. Certificate holders also must assess a flightcrew member's state when he or she reports to work. If the carrier determines a flightcrew member is showing signs of fatigue, it may not allow the flightcrew member to fly. Flightcrew members should be cognizant of the appearance and behavior of fellow flightcrew members, including such signs of fatigue as slurred speech, droopy eyes, requests to repeat things, and attention to the length of time left in the duty period. If a flightcrew member (or any other employee) believes another flightcrew member may be too tired to fly, he or she would have to report his or her concern to the appropriate management person, who would then be required to determine whether the individual is sufficiently alert to fly safely.	If this is truly a joint responsibility, placing the "ultimate" decision and responsibility back on the carrier to "assess a flightcrew member's state" when reporting to work is unacceptable. It is extremely important that after the air carrier has fulfilled its obligations, the responsibility for ensuring proper rest remains with the flightcrew member.
In addition, under today's proposal, carriers would need to develop and	Establishing an internal evaluation and audit program to

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implement an internal evaluation and audit program to monitor whether flightcrew members are reporting to work fatigued. The FAA anticipates that the program would look at both the number of instances in which this happens as well as the reasons contributing to the problem. The FAA is aware of anecdotal reports of pilots flying when fatigued because they are short on sick leave, as well as instances when pilots have called in sick when the true problem was fatigue. As part of the internal audit, a carrier may need to delve into the reasons flightcrew members call in sick to make sure it is capturing accurately incidents of pilot fatigue. It could choose to create a separate fatigue category to mitigate the risk of pilots calling in sick when in fact they are fatigued.	monitor flightcrew fatigue is an impossible task with an improbable result. If a person repeatedly reports to duty fatigued, the natural result will be to question that individual's ability to fulfill the responsibilities of the profession. By establishing this requirement, the government is attempting to regulate the behavior of an individual by placing the responsibility on the employer.
A carrier would be required to take steps to correct any fatigue problem that it identifies. For example, if the carrier became aware that flightcrew members were commuting during their WOCL, the carrier could require that all flightcrew members spend the night prior to starting a series of FDPs within the local commuting area. The carrier could also implement other measures to address problems associated not only with commuting, but any behavior that could lead to flightcrew members reporting for FDPs unfit for duty.	This is another requirement that will force employers to punish the many for the bad conduct of the few. The natural result of imposing such a requirement on the employer will be to fire employees that continually ignore the previously stated requirement that they become responsible for their own actions.
Several ARC members urged that these requirements be encapsulated in a non-punitive fatigue policy. While the FAA certainly supports such policies, it also recognizes that requiring carriers to develop and implement non-punitive fatigue policies is challenging from a regulatory perspective. Carriers are entitled to investigate the causes for an employee's fatigue. If a carrier determines that the flightcrew member was responsible for becoming fatigued, it has every right to take steps to address that behavior. To the extent the fatigue may be a function of the carrier not following the regulatory requirements, the FAA certainly would investigate and possibly	The ARC was correct in requesting a voluntary system that ensures individuals will adhere to the basic regulation that they do not fly when too fatigued to perform duties safely. The self-reporting possibility will be eliminated if an individual flies when fatigued, which will be a deliberate act which is not covered by the ASAP program.

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initiate enforcement action. In addition, self-reporting could be encapsulated in a carrier's voluntary disclosure program under the FAA's Aviation Safety Action Program (ASAP), which has certain non-punitive provisions built into the program. C. Fatigue Training	
The FAA believes fatigue-based training requirements are critical to informing flightcrew members how their personal behavior can unwittingly lead to fatigue, and how to mitigate the risk of fatigue in an industry that does not follow a traditional 9-to-5 work day. Fatigue training is not currently required under any regulatory regime. In the presentation to the ARC by the sleep specialists, all specialists noted that people regularly underestimate their level of fatigue, often to dangerous levels. The ARC generally agreed that fatigue training was a good idea, and several members noted that such training should extend to all ``stakeholders'', e.g., employees of the certificate holder responsible both for scheduling and for safety of flight, rather than just flightcrew members.	Fatigue Risk Management Plans with training elements are definitely required by the law passed by Congress. To have duplicative requirements is neither helpful nor appropriate. The Congressionally mandated programs must be reconciled with this rulemaking.
The FAA agrees that flightcrew members do not bear sole responsibility for making sure they are adequately rested and that they are not the only employees of the carrier who need to be trained on the impact of fatigue on the safety of flight. The agency is proposing to require fatigue training for each person involved with scheduling aircraft and crews, all crewmembers and management personnel. The FAA is proposing to require 5 hours of initial training for all newly-hired, covered employees prior to starting work in that capacity and 2 hours of annual, recurrent training. This training would be approved through the agency's Operations Specifications (OpSpec) process. The training curriculum would address general fatigue and fatigue	LAC recommends that the FAA adopt a performance-based standard for the training rather than an arbitrary hourly requirement. Indeed, if the agency mandates hours, it must establish the basis for the number. Having persons attend mandatory classes based upon hours does not enhance the individual's comprehension. This is particularly true with respect to the human factor issues such as fatigue; both certificate holders (i.e., the air carrier and the flightcrew member) must have assurance that the training is comprehended. The company urges the agency to consider testing as a method of ensuring the training was indeed learned as opposed to mandating hours of training.

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countermeasures along with the following subject areas: • FAA regulatory requirements for flight, duty and rest, and NTSB recommendations on fatigue management; • The basics of fatigue, including sleep fundamentals and circadian rhythms; • The causes of fatigue, including medical conditions that may lead to fatigue; • The effect of fatigue on performance; • Fatigue countermeasures, prevention and mitigation; • The influence of lifestyle, including nutrition, exercise, and family life, on fatigue; • Familiarity with sleep disorders and their possible treatments; • The impact of commuting on fatigue; • Flightcrew member responsibility for ensuring adequate rest and fitness for duty; and • The effect of operating through and within multiple time zones. In addition, the FAA recognizes that the study of fatigue and fatigue mitigation is on-going. Changes may need to be made to training programs even after approval by the FAA. Accordingly, whenever the Administrator finds that revisions are necessary for the continued adequacy of an approved fatigue education and training program, the certificate holder must, after notification, make any changes in the program that are deemed necessary by the Administrator. The FAA anticipates that such changes would be implemented through the agency's OpSpecs as provided for in 14 CFR 119.51, providing carriers with an opportunity to provide input and appeal rights.	The carrier must be allowed to customize its training program to fit its operations; while a list of subjects is helpful, it is neither all inclusive nor always appropriate for the operator or the flightcrew member.
D. Flight Duty Period There are numerous studies that generally address fatigue, as well as models	This extremely complicated explanation of the various methods of ensuring fatigue is “controlled” flies in the face of

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that have been developed. The models predict fatigue-based performance degradation based on data input such as when a flight begins, how long it lasts, whether there is a rest opportunity, and the local time of day at departure and landing. Only one of these models has been validated in the aviation context, although there is general validation in the railroad and motor carrier industries. The available validations are not directly applicable to aviation because of the impact of relatively rapid movement within multiple time zones.	"simplifying" the regulations associated with flight and duty time. Indeed, after reading the explanation and the regulations, LAC would have to manage no less than three separate time schemes based on the current gateway bases of flightcrew members. This is unduly burdensome at best and completely unmanageable at worst.
While there is ample science indicating that performance degrades during windows of circadian low and that regular sleep is necessary to sustain performance, there is no evidence that flying multiple segments is more fatiguing than flying one or two segments per duty period. However, multiple segments require more time on task because there are more take-offs and landings, which are both the most task-intensive and the most safety-critical stages of flight. Also, pilots appear to generally agree that flying several legs during a single duty period could be more fatiguing.	While there are plenty of "studies", "research" and antidotal accounts, the agency provides no scientific evidence that justifies this complicated amalgamation of crew fatigue management—particularly with respect to non-scheduled operations.
One approach to addressing fatigue is to link the length of duty directly related to flight to the time of day and the number of legs that are scheduled to be flown. This approach recognizes the additional fatigue introduced by night-time flying and by flying several legs, with multiple take-offs and landings. As discussed earlier, the current regulatory system in the United States provides variability based on whether a given operation is flown under domestic, flag or supplemental rules; but within each category of operation there is little to no variability in permissible flight time based on the particular operation.	There must be recognition of the individual's duty and responsibility as a professional along with the type of operations the person enjoys flying. While there may be "little or no variability in permissible flight time based on the particular operation"; there is definitely recognition of the blatantly different types of operations under the current rules. The agency certainly recognized that distinction when it created subpart S and it cannot ignore the same facts in today's rulemaking.
Other jurisdictions have largely eliminated the concept of a uniform flight time in favor of a variable FDP that encompasses flight time but also includes	

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other duties directly related to flight. An FDP is duty consisting of training required by the certificate holder's approved flight training curriculum and qualification segment to be conducted in a simulator, flight training device and aircraft training, as well as pre-flight deadheads without an intervening rest, and all duties from the time the flightcrew member is required to report for duty to fly until the last movement of the aircraft. An FDP begins when a crewmember is required to report for duty that includes a flight, series of flights, or positioning flights (including part 91 ferry flights) and ends when the aircraft is parked after the last flight and there is no plan for further aircraft movement by the same crewmember. Under the UK's CAP-371 an FDP is limited to no more than 13 hours under a minimum crew pairing, but may be increased through augmentation or split duty rest, and is reduced based on flying in the WOCL or flying multiple legs. The minimum FDP is 9 hours, unless flying multiple night-time operations, when FDP is reduced to 8 hours. A pilot in command may extend the FDP up to 3 hours due to unforeseen circumstances. Any duty immediately preceding flight check-in is also considered FDP, as is simulator training conducted during the same duty period if prior to flying, regardless of whether there is a break. Under EU-OPS subpart Q, the maximum FDP is 13 hours, reduced at 30-minute increments per segment after the second segment down to a 2-hour reduction. One-hour extensions are permitted, except when an FDP has more than six segments, when no extension is permitted. There is a more complicated formula that applies when encroaching on the WOCL. There are no more than two extensions during any 7-day period. Schedule robustness is addressed by requiring that actual operations not exceed FDP more than 33 percent of the time (i.e., actual flights are within the FDP limits at least 67 percent of a scheduling season). A 2-hour extension is permitted at the	

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discretion of the entire crew for unforeseen circumstances. The pending EASA proposal on flight duty and rest would adopt the same FDP concept as CAP-371 and EU-OPS subpart Q. Like those standards, the maximum FDP is 13 hours unless a mitigation strategy such as augmentation is adopted, and the FDP is reduced based on time of day and number of legs flown. Unlike the CAP-371, and similar to EU-OPS subpart Q, the EASA proposal contemplates that schedules that do not regularly meet the maximum-allowable FDP will be changed. The CAP-371 merely requires a pilot in command to report when the FDP is exceeded.	
The ARC members generally agreed with the approach adopted in CAP-371 and by EASA, although they could not agree on how conservative maximum FDPs should be. Tables A(1) and A(2) depict the two ranges of FDP discussed by the ARC, with Table A(1) generally representing the labor position, and A(2) generally representing the carriers' position. Both tables reduce the amount of FDP during the nighttime hours to address flying during one's WOCL, and both reduce the amount of FDP once a flightcrew member has flown more than four legs. Flightcrew members would enter the table based on the time at their home base (i.e., the city where they regularly fly from) unless they have acclimated to a different time zone, at which point they would enter the table based on local time. In addition, the FDP would be reduced by 30 minutes for unacclimated flightcrew members. Extensions no greater than 2 hours (possibly as many as 3 hours internationally or for augmented flights) beyond a scheduled FDP would be allowed for circumstances beyond a carrier's control. The decision to extend would rest on both the carrier and the pilot in command, although specific coordination might not be required in every instance. In addition, there would be limits on the number of times a crew pairing could be extended in any 168-hour period, with discussion of whether that limit should be once or twice, but general	Since Lynden Air Cargo was not a party to the ARC deliberations, it cannot comment on the agreements or disagreements; the company can point out that its operations are not conducive to the "home base" approach. Our flightcrews are positioned all over the world at any given day or time; to have to track the "home base" time against whether the individual has "acclimated to a different time zone" and the other factors would be extremely burdensome without any benefit to safety.

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agreement that it should not be allowed on consecutive days. A flightcrew member could not continue an FDP beyond the extension except under emergency circumstances.	

TABLE A(1) – FLIGHT DUTY PERIOD: UN-AUGMENTED OPERATIONS

Time of start (Home base or acclimated)	Maximum flight duty period (hours) for lineholders based on number of flight segments						
	1	2	3	4	5	6	7+
0000-0359	9	9	9	9	9	9	9
0400-0459	10	10	9	9	9	9	9
0500-0559	11	11	11	11	10	9.5	9
0600-0659	12	12	12	12	11.5	11	10.5
0700-1259	13	13	13	13	12.5	12	11
1300-1659	12	12	12	12	11.5	11	10.5
1700-2159	11	11	10	10	9.5	9	9
2200-2259	10.5	10.5	9.5	9.5	9	9	9
2300-2359	9.5	9.5	9	9	9	9	9

TABLE A(2) – FLIGHT DUTY PERIOD: UN-AUGMENTED OPERATIONS

Time of start (Home base)	Maximum flight duty period (hours) for lineholders based on number of flight segments						
	1	2	3	4	5	6	7+
0000-0159	9	9	9	9	9	9	9
0200-0459	10	10	10	10	9	9	9
0500-0659	12	12	12	12	11.5	11	9
0700-1259	13	13	13	13	12.5	12	10.5
1300-1659	12	12	12	12	11.5	11	10.5
1700-2159	11	11	11	11	9	9	9
2200-2259	10.5	10.5	10.5	10.5	9	9	9
2300-2359	9.5	9.5	9.5	9.5	9	9	9

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In order to assure that the extensions are not abused and that carriers are creating schedules contemplating circumstances that may be beyond their	This mere mention of “chronically-delayed…markets” indicates that the FAA does not wish to deal with the reality of its long standing rule regarding <u>non-scheduled</u> operations. The fact

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control, but that are reasonably foreseeable (e.g., seasonal weather trends, planned runway construction, chronically-delayed airports or markets), a carrier would provide the FAA with scheduled FDPs for all its crew pairings and the actual FDPs, including any extensions, on a regular basis. Some argued this cycle should be as little as once a month, while others argued a quarterly reporting cycle was sufficient. Should the carriers' actual FDPs fail to meet the scheduled FDP too many times during the reporting cycle, they would be required to change the scheduled FDPs to more realistic levels. The ARC agreed that 95 percent of a carrier's schedules would need to fall within the maximum FDP depicted in Table A(1) or A(2). In order to identify specific crew pairings that were problematic, each crew pairing would need to fall within the limits in the tables for a lesser percentage of the time, somewhere between 70 percent and 85 percent. The FAA has decided to propose the more conservative FDPs depicted in Table A(1), with a 2-hour extension for unforeseeable circumstances beyond the carrier's control permitted once in a 168-hour period. Since the entire flightcrew is impacted by the extension, only one flightcrew member needs to have utilized the extension in the previous 168 hours for it to no longer be available.	that the agency has established its current regulations based upon different operational profiles cannot be ignored. To "blame" the "market" for the differences flies in the face of the fact that non-schedule air transportation is essential; it cannot be replaced by other modes of transportation, particularly for the delivery of international cargo. The agency must not ignore the fact that non-scheduled means exactly that, there is no known schedule and therefore it is inherently beyond the control of the operator. To even suggest that an operator must "schedule" for events that are "reasonably foreseeable" but beyond their control is nonsensical. The vast majority of LAC's air transportation services are not reasonably foreseeable; therefore they are definitely beyond its control; to develop a schedule that would foresee the unforeseeable even 70 percent of the time would be extremely problematic.
If the extension is less than 30 minutes, the FAA anticipates permitting multiple extensions during the 168-hour period. The FAA has tentatively determined that short incursions into the permissible extension are unlikely to be fatiguing given the other requirements of today's proposal and that limiting a flightcrew member to a single weekly extension that could be as small as five or ten minutes is unreasonable. However, the extensions are intended to address unforeseeable circumstances beyond the carrier's control. Such circumstances should be of sufficiently short duration that the carrier could not reasonably make schedule adjustments. Thus, while the	The ability to make "adjustments" in LAC's unique operations is also problematic; the company is requested to deliver essential services to remote locations where weather and other "acts of God" are definitely beyond its control are common. These types of operations are essential to the livelihoods to the communities, countries and people that are serviced by our unique fleet type. To establish regulations that ignore long-standing, essential air services is irresponsible.

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FAA contemplates that adverse weather could fit within the criteria because it is beyond the control of the certificate holder, it would not always be considered unforeseeable. Carriers should anticipate thunderstorms in many parts of the United States during the summer months. Likewise, heavy snow in the northern parts of the country should be anticipated during the winter, and the jet stream follows basic seasonal patterns. By the same token, carriers are not responsible for air traffic delays; however, if they are operating out of chronically delayed airports, air traffic delays are clearly foreseeable. To the extent even small extensions are regularly occurring, the schedule reliability requirements discussed by the ARC should require schedule adjustments, even when encroachments beyond the times in the FDP table are very small. The FAA recognizes that adopting the numbers in Table A(1) is a conservative approach. The FAA has decided to propose the more conservative numbers because it has little experience with this type of regulatory regime. However, the numbers contemplated under both tables are very similar, and the FAA is open to arguments that a more expansive FDP is merited. The agency also recognizes that upon completion of an FDP, a flightcrew member could be assigned other duties as long as he or she is provided with a required rest opportunity prior to commencing his or her next FDP. The underlying premise of today's proposal is to ensure flightcrew members are adequately rested during the time they are responsible for the operation of aircraft. To the extent other duties are not directly related to the safe operation of flight, the FAA believes there is no need to reduce the current implied daily duty limit of 16 hours in un-augmented operations, as long as those duties do not introduce the potential for fatigue during flight. The reduction in maximum FDP during nighttime hours is broadly supported by existing sleep science. Although not addressed by sleep studies, the FAA	

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has also tentatively decided to reduce the amount of available FDP depending on the number of legs flown (flight segments) because of a general agreement among the ARC members and FAA staff previously employed as pilots by commercial air carriers that multiple take-offs and landings are more fatiguing. Much of the available science is based on laboratory studies, with exceptionally limited validation in the aviation context; accordingly, the FAA has tentatively decided to rely on the experience of these individuals rather than assuming no adverse impact on safety. The FAA is not proposing to make any adjustments for the first four flight segments based on this same experience. The linear reduction contemplated in the EASA regulations (which is used for multiple purposes) appears to have more to do with regulatory simplicity than with any actual experience or science. As recommended by the ARC, a flightcrew member would enter the FDP table based on home base time, unless acclimated to a different time zone. Thus, if a flightcrew member ordinarily flies out of Chicago, the flightcrew member would enter an FDP as though he or she were in Chicago, regardless of where he or she is physically located. A 10 a.m. crew pairing out of Heathrow would be treated as if it commenced at 4 a.m., because of the 6-hour time difference between Chicago and London. If the operation requires the flightcrew member to cross more than four time zones, he or she would be considered unacclimated, and there would be a 30-minute reduction in the maximum FDP.	The examples are of scheduled operations; in LAC's unique operational environment, the "home" base of its flightcrews change frequently. While the company's "home base" may be in Alaska, the "home base" of extended work is often in foreign countries such as Papua New Guinea. Again, the current subchapter S regulations are based upon the government's understanding of non-scheduled operations, even those as unusual as LAC's; it is inconceivable that the agency can ignore these operational differences.
The FAA has also decided to propose the reporting requirements discussed by the ARC to assure realistic scheduling. The agency has tentatively decided that reports be filed with the FAA every two months. The ARC discussed a range of one to three months. The FAA believes a monthly reporting requirement could be excessively burdensome to both the	

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certificate holders and the FAA. By the same token, if the reporting interval is too long, carriers may avoid addressing common delay scenarios, simply waiting them out. Under today's proposal, carriers must first demonstrate that 100 percent of the scheduled crew pairings fall within the limits in the FDP table. Actual system-wide FDPs should not exceed the maximum levels in the FDP table more than five percent of the time. Each crew pairing would need to fall within the FDP table 80 percent of the time. The agency believes a 20 percent variation for a specific crew pairing provides carriers with sufficient flexibility to address multiple yet small excursions beyond the FDP table, while still forcing the carriers to recognize when a particular crew pairing is problematic. Because no flightcrew member may exceed the limits in the FDP table beyond 30 minutes more than once in any 168-hour period, the FAA does not believe a 20 percent variation will result in any immediate adverse safety situation. Should any of the three proposed reporting requirements be exceeded, a carrier would be required to readjust the problematic crew pairings to more realistic schedules. These adjustments, which could be seasonal in nature, would be on-going and would apply to subsequent years. To the extent a carrier could immediately implement measures to improve schedule fidelity, it should do so. However, the ability of carriers to immediately address the scheduling issue is difficult to evaluate without understanding the impact of published schedules on resolving the problem. The FAA has notionally proposed that changes be made within 60 days, but it is interested in better understanding the impact of such a requirement on carriers' schedules.	

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With that in mind, the FAA seeks comment on the following:	The following answers to specific questions should not be construed as LAC's acceptance of, or agreement with, the FAA's proposal as written. Indeed LAC urges the agency to adopt NACA's proposal in most regards; where the company differs from the association's recommendations, it has provided justification based upon its unique operational requirements.
(1) Please comment on adopting maximum FDPs. (a) Should the maximum FDP vary based on time of day?Should it vary based on the number of scheduled flight segments? (b) Should the proposed limits be modified up or down, and to what degree? Please provide supporting data.	(a) Yes, although the proposal gives no consideration to non-scheduled, all cargo international operations; it appears to be based solely upon domestic operations. It is apparent that there was very little research in deriving the limits presented in tables A and B. They are not aligned with each other and there is no supporting scientific evidence provided for the seemingly random selection other than loosely worded references to CAP 371 and EU-OPS. (b) If section 117 is adopted, we recommend the FDPs provided in comments to section 117.15 below. (c) See comments to section 117.15 below. Please refer to NACA comments for supporting data.
(2) Please comment on permitting flightcrew members and carriers to operate beyond a scheduled FDP. (a) Is the proposed 2-hour extension appropriate? (b) Is the restriction on a single occurrence beyond 30 minutes in a 168-hour period appropriate? (c) Should a flightcrew member be restricted to a single occurrence regardless of the length of the extension? Please provide supporting data.	(a) Yes, LAC concurs, in theory, to extensions to maximum FDPs, not scheduled FDP. (b) No, the nature of LAC operations, the area of operations, and the services provided makes the 2 hours inadequate to address the delays encountered almost daily. LAC would suggest a minimum of 4 hour extensions. (c) No, supplemental, non scheduled operations require flexibility not needed by scheduled domestic operations. LAC suggests no limit to justified FDP extensions. Please refer to NACA comments for supporting data.
(3) Please comment on the proposed schedule reliability reporting requirements. Should carriers be required to report on crew pairings that exceed the scheduled FDP, but not the maximum FDP listed in the FDP table?	No, this requirement is directed to "scheduled operations". LAC does not operate "scheduled" services or operate a hybrid of scheduled and non-scheduled services. Any reference to scheduled FDP should be removed from the proposal and replaced with maximum.

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(4) Should carriers be required to report on more parameters, such as cumulative duty hours or daily flight time? If so, why?	No, maximum FDPs exceeded are sufficient.
(5) What should be the interval between reporting requirements?	A maximum of quarterly.
(6) How long after discovering a problematic crew pairing should the carrier be afforded to correct the scheduling problem?	Considering the totality of the proposal and its bias to scheduled operations, quarterly reports for non-scheduled carriers is recommended, a minimum of 45 days could be established if fatigue issues were identified.
E. Acclimating to a New Time Zone Unlike other forms of transportation, where an individual moves gradually through multiple time zones over the course of the day, the nature of aviation allows an individual to traverse several time zones over a relatively short period of time. This phenomenon exposes flightcrew members to a greater sense of disorientation or jet lag than employees in other forms of transportation. For trips with short turn around times, a flightcrew member likely would not acclimate, and would simply enter the FDP table based on his or her home base time. However, flightcrew members remaining in a new theater for longer periods of time may need to acclimate to the new theater. During the question and answer session with ARC members, the sleep specialists explained how an individual acclimates to time zones when flying long range operations. They stated that having sleep opportunities during a physiological night is the most important fatigue mitigation strategy for global travel. They also noted that an individual attempting to acclimate to a new time zone will adjust his or her clock approximately 1 hour per day for each hour of time zone difference. The ARC members noted that based on their collective personal experience, one could acclimate much more quickly if one managed his or her sleep opportunity appropriately. The sleep specialists also noted that even if an individual consciously decided not to	Again, this information is derived from scheduled operations that do not change home bases on a frequent basis. LAC has developed a comprehensive and effective method of ensuring its flightcrews are sufficiently rested during their journeys around the world. This is particularly true when their “home base” changes for extended intervals.

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acclimate to a new time zone, given enough time, the individual would begin to acclimate anyway because of the differences in exposure to daylight. The ARC discussed various approaches to determine whether a flightcrew member is acclimated before accepting an assignment for an FDP. The ARC originally defined the un-acclimated condition as flying across five or more time zones. Moving beyond these constraints would qualify as moving into a new theater of operations. The ARC members agreed that the continental United States should constitute a single theater so that a flightcrew member would always be acclimated when flying domestically. The ARC concluded that to reset from an un-acclimated condition to an acclimated condition a flightcrew member would require either three consecutive physiological night's rest, during which period the flightcrew member could fly, or a 30 to 36 hour layover rest period. Some ARC members noted that a flightcrew member could be on duty during the period encompassing 3 local nights, but not during local nighttime hours. As noted previously, sleep science has not been validated in the aviation context. The members of the ARC universally rejected the premise that it would take between six and 9 days to acclimate to a European time zone. The FAA is inclined to agree with the ARC members' experience, especially given the limited scientific information specific to aviation. The FAA also recognizes that assuring that length of time to acclimate to a new theater is impractical in the aviation context.	
The FAA proposes to permit a carrier to adjust where the flightcrew member enters the FDP as an acclimated crew member if the individual has been in a new theater of operations for 72 hours or has been given at least 36 consecutive hours free from duty. Remaining in the same theater for 72 hours allows for three physiological night's rest. A 36 consecutive hour break in	

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duty does not allow for the same amount of rest, but allows the individual to structure the available rest opportunity in a manner that best suits his or her personal sleep patterns. The FAA is not proposing to stipulate that an unacclimated flightcrew member will only become acclimated when continuing to fly within a new theater as long as that flightcrew member does not fly at night. This strikes the agency as an unnecessary constraint. While the continental United States is considered a single theater, operations from one part of the United States could trigger the need to acclimate sooner than operations from another part of the United States. Thus, a flight from New York to Hawaii could trigger a need to acclimate in Hawaii, while a flight from Los Angeles to Hawaii would not. The ARC discussed the amount of rest needed for flightcrew members returning to their home base after becoming acclimated in another theater. The ARC members noted that the flightcrew member is not truly acclimated to the new theater but also is no longer acclimated to his or her home base. Ultimately, the ARC members agreed that a flightcrew member must always find at least 30 to 36 continuous hours free of duty in any 168 consecutive hours and that once a flightcrew member is given this rest, the flightcrew member is considered acclimated to local time. Based on this discussion, the FAA has decided against imposing any unique restrictions on a flightcrew member simply because he or she has returned to his or her home base. Acclimation to a home base is treated the same as any other acclimation to a new theater. However, the FAA is proposing to require a greater rest opportunity when a flightcrew member has been away from his or her home base for more than 168 hours. In this instance, the FAA proposes to require a rest period that includes 3 physiological nights, rather than 36 hours free from duty or	

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permitting the flightcrew member to fly during that approximately 72-hour period. This decision is based on the ARC members' consideration of the amount of rest being dependent on how long the flightcrew member was away from home base. The ARC reviewed the current regulation, which requires a flightcrew member who exceeds 12 flight hours to receive twice the amount of rest upon return to home base. The ARC members also discussed the impact of multiple consecutive round-trip flights where flightcrew members would fly consecutive flights to an international destination, lay over for a day, and then return to the home base (e.g., Houston, Texas, to Paris, France, and return to Houston). These types of pairings are common, with a flightcrew member potentially flying three roundtrips in a week. The concern was that these types of flights will typically have layovers from 20 to 28 hours. The length of the layovers is primarily based on scheduling concerns.	
The length of the layover does not initially appear problematic, particularly in light of the current regulations which only require one 24-hour break in duty in a 7-day period. However, when the flights are particularly long, a layover of approximately 24 hours becomes a problem because the flightcrew member is constantly flipping his or her internal clock. When one runs the scenario through the SAFTE/FAST model with a three-person augmented crew, the flightcrew member reaches high fatigue limits during the second round-trip flight and is dangerously fatigued during the third round-trip flight. However, when the flights are not particularly long flights, flightcrew members appear to have no problem flying three roundtrip flights, even with the 24-hour layovers. The ARC developed a draft regulatory proposal to address operations so long that they almost trigger a fourth flightcrew member. Under that proposal, if	

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the flight assignment is for a three pilot flight crew and the layover is between 20 and 28 consecutive hours and the two FDPs, separated by the layover rest, are greater than 22 to 24 hours, then the flight crew requires two physiological night's rest or one physiological night's rest with an 8-hour restriction on the next FDP. Upon reflection, the FAA has decided that the ARC proposal is unduly complicated and only addresses a small number of potential operations. The agency has decided against proposing it. However, as part of the required training program proposed today, carriers should be educated on the risks associated with flipping a flightcrew member's internal clock, particularly when conducting operations that are on the cusp of requiring an additional flightcrew member.	
The FAA requests comments on the following: (7) Is a 3-day adjustment to a new theater of operations sufficient for an individual to acclimate to the new theater?	LAC concurs with the NACA position that 36 hrs. should be sufficient
(8) Is a 36-hour break from duty sufficient for an individual to acclimate to a new theater?	Yes
(9) Should flightcrew members be given a longer rest period when returning to home base than would otherwise be provided based on moving to a new theater?	No. The carrier must be allowed to adjust the intervals dependent upon the overall schedule for the flightcrew. As mentioned in our cover letter, LAC has developed a comprehensive and efficient method of ensuring proper rest for its flightcrews.
(10) Should the FAA have different requirements for flightcrew members who have been away from their home base for more than 168 hours? If so, why?	No, this overly complicates the situation and is not supported by science.

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<tr><td>(11) (a) Should the FAA require additional rest opportunities for multiple pairings between two time zones that have approximately 24-hour layovers at each destination?
(b) What if the scheduled FDPs are well within the maxima in the applicable FDP table or augmentation table?</td><td>11(a)-(b) No, again, the idea is to simplify the method of “scheduling” flightcrews; as long as the operation is performed with the maximum FDP and/or acclimation is assured, there is no need to require “additional” elements.</td></tr>
<tr><td>F. Daily Flight Time Restrictions

Initial ARC discussion of FDPs assumed that, as is the case in CAP-371 and the EASA regulations, there would be no daily limit on flight time. Instead flight time would effectively be limited to approximately 2 hours less than the FDP because FDP assumes a flightcrew member will report for duty an hour and a half before flying and will spend approximately 30 minutes after completing all flying for the day completing paperwork. In that context, the maximum amount of time flying during the middle of the day could increase from the current 8 hours to as much as 11 hours, almost a 50 percent increase. The ARC noted that the FAA may decide that daily limits on flight time are still needed and proposed a variable flight time based on the hour of the day. Tables B(1) and B(2) represent potentially acceptable flight time limitations within FDPs. Table B(1) generally represents the position of the carriers, while Table B(2) generally represents the position of labor.</td><td></td></tr>
<tr><td>TABLE B(1) – MAXIMUM FLIGHT TIME LIMITS<table><tr><th>Time of start (Home base)</th><th>Maximum flight time (hours)</th></tr></table></td><td></td></tr>
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<tr><td>0000-0159</td><td>7</td></tr>
<tr><td>0200-0459</td><td>8</td></tr>
<tr><td>0500-0659</td><td>10</td></tr>
<tr><td>0700-1259</td><td>11</td></tr>
<tr><td>1300-1659</td><td>10</td></tr>
<tr><td>1700-2159</td><td>9</td></tr>
<tr><td>2200-2259</td><td>8.5</td></tr>
<tr><td>2300-2359</td><td>7.5</td></tr>
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TABLE B(2) – MAXIMUM FLIGHT TIME LIMITS

Time of start (Home base)	Maximum flight time (hours)
0000-0459	7
0500-0659	8
0700-1259	9
1300-1959	8
2000-2359	7

In addition, the CAA presented an alternate regulatory approach, whereby flight time limits for all-cargo operations would be more expansive and would differ dependent on whether the particular operation was a domestic operation or an international operation. The numbers proposed by the CAA are presented in Tables B(3) and B(4).

TABLE B(3) – MAXIMUM FLIGHT TIME LIMITS, DOMESTIC ALL-CARGO

Time of start (Home base)	Maximum flight time (hours) 1-4 sectors	Maximum flight time (hours) 5+ sectors
0000-0459	8	7
0500-1459	11	9
1500-1659	10	8
1700-2359	8	7

TABLE B(4) – MAXIMUM FLIGHT TIME LIMITS, INTERNATIONAL ALL-CARGO

	Maximum flight time (hours) (2 pilot)	Maximum flight time (hours) (2pilot, 1 engineer)

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<tr><th>NPRM</th><th>Comments</th></tr>
<tr><td><table><tr><td>Flight time includes WOCL</td><td>8</td><td>12</td></tr><tr><td>Flight time does not include WOCL</td><td>10</td><td>12</td></tr></table></td><td></td></tr>
<tr><td>The FAA has decided to propose a variation of the more conservative maximum daily flight time limits for unaugmented operations in Table B(2). The agency proposes to extend the number of hours reflected in Table B(2) by one hour. This approach melds the different approaches in Tables B(1) and B(2), allowing for slightly higher flight time limits during early morning and daytime hours than are currently allowed, but not permitting extensions that, at some hours, come close to a 50 percent increase over the current limits. Because current unaugmented operations are limited to 8 hours, the FAA's ability to evaluate the impact of significantly longer flight time limits on aviation safety is limited. Accordingly, the FAA believes it is appropriate to propose overall limits that are more conservative than those depicted in Tables B(1), B(3) and B(4).

The FAA recognizes that it has allowed up to 12 hours of flight time in circumstances that it has considered augmented operations, even though the third flightcrew member is not able to fly the plane. This has occurred in supplemental and flag operations when the flightcrew consists of two pilots and a flight engineer, and was more common when the fleet of aircraft requiring flight engineers was larger. Accordingly, this data set is much smaller than the set based on the 8-hour domestic limitation. Nevertheless, based on the safety history of these operations, it may be possible to demonstrate that longer flight time limits will not adversely affect safety, particularly during daytime hours when the flightcrew had an opportunity to sleep through their WOCL the previous night.</td><td></td></tr>
<tr><td>The FAA also recognizes that daily flight time limits will have the greatest</td><td></td></tr>
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impact on crew pairings that consist of a single leg. This is because when flying multiple segments, more of the FDP will be spent on layovers. Thus, for a single segment pairing, almost all of the FDP will consist of flight time, while for a pairing with three or four legs, much of the FDP will not consist of flight time. As a carrier adds legs, the FDP becomes more of a constraint than the flight time limit. The FAA has decided against proposing special rules for all-cargo operations because there are no physiological differences between pilots who fly cargo planes and pilots who fly passenger planes. As noted before, the FAA believes the distinctions between domestic and international operations are largely irrelevant. To the extent they are truly distinct (generally due to the length of the trip), those differences are better addressed through augmentation rather than simply by extending the allowable flight time. Augmentation is discussed in greater detail in the next section.	
(12) If the FAA adopts variable FDP limits, is there a continued need for daily flight time limits?	No, the proposed FDPs are more than sufficient. The addition of flight time limitation will not increase safety; it merely establishes an additional layer of complication to an already overly complicated proposal.
(13) If the FAA retains daily flight time limits, should they be higher or lower than proposed? Please provide data supporting the answer.	LAC is in opposition to any flight time restriction. Please refer to NACA comments for supporting data.
(14) Should modifications be made to the proposed flight time limits to recognize the relationship between realistic flight time limits and the number of flight segments in an FDP?	See answers to questions 12 and 13 above as well as the information provided in NACA's comments.
G. Mitigation Strategies 1. Augmentation	

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Even with the variable FDP and flight time, there will continue to be a need to augment crews for longer flights. Ideally, augmentation should follow the same approach as FDP, i.e., circadian rhythms, acclimation to time changes, and multiple flight segments should be considered in determining how much augmentation is required. Further consideration should be given to the quality of the available rest facility. Essentially, the current regulations require augmentation beyond 8 hours of scheduled flight time. Under the FAA's flag and supplemental rules, augmentation permits the following increases in flight time above the 8-hour limitation contemplated under the agency's domestic rules:	
If there are three flightcrew members (one of whom may be an engineer), maximum flight time is extended to 12 hours. There is no requirement for a rest facility. If there are four pilots (or three pilots and two flight engineers), maximum flight time is extended to 16 hours. There must be an FAA-approved rest facility on board the aircraft (generally a bunk). There are no hard constraints on flight time that exceeds 16 hours. Instead, the FAA has addressed the carriers' fatigue mitigation practices on a case-by-case basis. The FAA believes that its current approach to augmentation fails to consider several pertinent factors. It fails to adequately consider the qualifications of all of the flightcrew members, giving credit for individuals who are not qualified to operate the controls; it fails to consider the varying quality of sleep facilities below a 12-hour flight time limit; it fails to recognize that, provided an opportunity for sleep is provided, some domestic operations	

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could benefit from augmentation; and, as is the case generally with the agency's flight and duty regulations, it fails to consider the impact of circadian rhythms. The FAA proposes to amend the existing regulations by varying the levels of augmentation credit depending on the quality of the rest facility, except that no credit would be given for rest in coach seats. The level of extensions would also vary based on when the flight takes place to account for circadian rhythms and whether the flight crew is acclimated. Domestic augmentation would be permitted if a sufficient rest opportunity is provided. Finally, all flightcrew members would have to be type-rated as a second-in-command (SIC) or pilot-in-command (PIC) and throughout the flight at least one crewmember on the flightdeck would have to be type-rated as a PIC. The FAA would also continue to permit extensions in flight time based on the number of flightcrew members, with greater credit given for four-man flightcrews than for three-man crews. The FAA believes this approach will provide carriers with a significant amount of flexibility. Should the carrier decide not to invest in superior rest facilities, it could opt to provide a lesser quality rest facility and add additional, qualified flightcrew members to extend the augmentation period. The FAA's proposal is largely based on the general recommendation of the ARC. In reaching its conclusions, the ARC members reviewed the scientific material regarding augmentation that was presented during its meetings. Following are key points made by the sleep specialists during their presentations. In-flight naps with augmented flightcrews are dramatically helpful in mitigating sleep debt.	

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When extending the FDP with an augmented flightcrew, augmented flightcrew members are presented with an opportunity for in-flight sleep, however the flightcrew members must take advantage of this sleep opportunity because augmentation is of no value if the entire flightcrew is awake. The value of augmented flightcrew operations depends on the available sleep facility, with a quiet, flat bunk being the most desirable. In-flight sleep has restorative value, and the flatter one is able to lie, the more beneficial the sleep.	
To divide in-flight duty and rest among the flightcrew appropriately, route guides for positioning of sleep should be developed for augmented flightcrews (i.e., not all crewmembers need to be provided for equal sleep opportunities; rather pilots responsible for more complicated duties such as take-offs and landings may need more of a sleep opportunity, and may need that opportunity at a more ideal time in the flight). In establishing the maximum scheduled FDP limitations for an augmented flightcrew, the ARC discussed the relative merits and safety of operations conducted with augmented flightcrews receiving in-flight rest, as compared to conventionally scheduled operations. The ARC noted that the type of rest facility needs to be addressed in the proposed rule and in advisory material. The most comprehensive evaluation of available sleep facilities was conducted by the Dutch government in 2007 to provide science-based advice on the maximum permissible extension of the FDP related to the quality of the available onboard rest facility and the augmentation of the flightcrew	

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with one or two pilots. Extension of Flying Duty Period by In-flight Relief (July 29, 2007) (TNO Report). The TNO report benchmarked existing research in arriving at its recommended values. The TNO report evaluated the quality of existing sleep facilities to determine how much sleep a flightcrew member could reasonably expect to get. The evaluation ranged from coach seats (a class IV rest facility) to bunks that were isolated from the rest of the crew and passengers (a class I rest facility). Based on the quality of the facility, the TNO Report assigned different values that would allow for an extension of the FDP. Based on its research, TNO decided against giving any credit for class IV rest facilities. The ARC noted that both the TNO Report and CAP-371, to varying degrees, assign value to in-flight rest opportunities that depend on the quality of the rest facility available on the aircraft. The ARC determined that there are approximately 20 different combinations of facilities among various certificate holders. The ARC members developed a rating system dependent on the ability to lie in a horizontal, flat position; control the amount of light and noise; and rest in a temperature-controlled environment; as well as the flightcrew member's time off task. Depending on the amount of points assigned to these areas, the amount of credit for receiving rest in a type of seat could be calculated. The ARC members suggested a Type I, II, and III scheme, resulting in the following classes of sleep facilities: • Class 1 rest facility: A bunk or other surface that allows for a flat sleeping position, is separated from both the flight deck and passenger cabin to provide isolation from noise and disturbance and provides controls for light and temperature. • Class 2 rest facility: A seat in an aircraft cabin that allows for a flat or near flat sleeping position (around 80 degrees from the seat's vertical centerline),is separated from passengers by a minimum of a curtain to	

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provide darkness and some sound mitigation, and is reasonably free from disturbance by passengers and/or flightcrew members. - Class 3 rest facility: A seat in an aircraft cabin or flight deck that reclines at least 40 degrees, provides leg and foot support, and is not located in the coach or economy section of a passenger aircraft. Accordingly, the ARC revised the sleep credit for the class rest facility to more closely align the percentages with the TNO Report recommendations as follows: - Class 1: 75 percent. - Class 2: 56 percent. - Class 3: 25 percent. - No credit for coach seats.	
The ARC determined that augmentation should be required when either the maximum scheduled FDP or flight time hour limit depicted in Tables A and B of this document is insufficient for the planned operation. The ARC considered that longer flights crossing multiple time zones or overnight flights could be better indicators of the need to augment than flight times. For example, an 8-hour, 45-minute flight during the day could be safely operated by an un-augmented flightcrew, but a 7-hour, 30-minute overnight flight should perhaps be augmented. One ARC member proposed that any planned pairing with greater than 6.5 block hours where the FDP infringes on the normal sleep cycle require augmentation. The ARC developed Table C, which combines the limits from the first (single flight segment) column of the proposed FDP table (Table A) with principles from the TNO Report.	

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TABLE C – FLIGHT DUTY PERIOD: ACCLIMATED AUGMENTED FLIGHTCREW

Time of start (home base)	Maximum flight duty period (hours and minutes) based on rest facility and number of pilots					
	Class 1 rest facility		Class 2 rest facility		Class 3 rest facility	
	3 pilots	4 pilots	3 pilots	4pilots	3 pilots	4 pilots
0000-0559	13:50	16:05	12:55	14:20	11:45	12:15
0600-0659	15:10	17:40	14:10	15:40	12:55	13:25
0700-1259	16:30	19:20	15:25	17:05	14:00	14:30
1300-1659	15:10	17:40	14:10	15:40	12:50	13:20
1700-2359	13:50	16:05	12:55	14:20	11:45	12:15

The ARC discussed placing an absolute cap of 16 or 18 hours (for a three- or four-man flightcrew, respectively) on the FDP, even though the TNO Report scheme results in a higher FDP. The ARC determined that higher FDPs could be achieved only by use of an FRMS. Under such a constraint, only augmented operations commencing between the hours of 7 a.m. and 1 p.m. would be constrained beyond Table C, and then only when the highest quality rest facility is provided. The ARC stated that its prescriptive approach could apply to most operations, but certificate holders engaged in ultra-long range operations could use an FRMS to develop an alternate means of fatigue mitigation tailored to their specific operations. The ARC members noted that some types of operations, such as air cargo operations, which operate under different demands and circumstances, might approach augmentation and fatigue differently than other types of operations.

The maximum scheduled FDP limitations for augmented flightcrew member operations with an unacclimated flightcrew are set forth in Table D.

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TABLE D – FLIGHT DUTY PERIOD: UNACCLIMATED AUGMENTED FLIGHTCREW

Time of start (home base)	Maximum flight duty period (hours and minutes) based on rest facility and number of pilots					
	Class 1 rest facility		Class 2 rest facility		Class 3 rest facility	
	3 pilots	4 pilots	3 pilots	4pilots	3 pilots	4 pilots
0000-0559	13:50	15:20	12:20	13;35	11:15	11:45
0600-0659	14:30	17:00	13:35	15:00	12:15	12:50
0700-1259	15:50	18:30	14:50	16:25	13:30	14:00
1300-1659	14:30	17:00	13:35	15:00	12:20	12:45
1700-2359	13:15	15:20	12:20	13:35	11:15	11:40

The ARC calculated the maximum scheduled FDPs in Table D for augmented flightcrew members who are not acclimated based on the same methodology provided for acclimated flightcrew members in Table C above. However, for unacclimated flightcrew members there is a roughly 30-minute reduction in the planned maximum FDP for augmentation calculation. The absolute cap of 16 and 18 hours would correspondingly be reduced to 15.5 and 17.5 hours, respectively.

The FAA has decided to propose the augmentation levels proposed by the ARC in Table C, except that the numbers have been rounded up or down to the closest half hour for regulatory efficiency. As suggested by the ARC, acclimated operations are capped at 16 hours if only a three-man crew is available and 18 hours if a four-man crew is available. In addition, the FAA is not proposing to implement Table D into the regulatory text because it is essentially a thirty minute reduction from Table C. Rather, the regulatory text specifies that the numbers in Table C are reduced by 30 minutes if a crew is not acclimated. This approach is consistent with the one proposed for un-augmented operations.

The ARC noted that augmentation should be used strictly for long flights and not to extend the FDP for multiple short flight segments. The ARC discussed

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whether more than two flight segments should be permitted in augmented flight operations and, if so, should an FRMS be required to do so. Some members of the ARC cautioned that augmentation should not be permitted to facilitate unnecessary additional flight segments or eliminate crew swaps. These individuals argued that augmentation was initially permitted to address those flights that could not reasonably be conducted within the existing rules at that time because the distances involved prevented long layovers or crew swaps. This issue was particularly relevant to the discussion of whether augmentation should be used for domestic operations. The primary concern related to multi-segment augmented flights was the available sleep opportunity for flightcrew members. Everyone acknowledged that flightcrew members are not going to sleep during take-off and landing. Accordingly, flight segments need to be sufficiently long to permit the flightcrew members to actually sleep. The ARC agreed that a flightcrew member assigned to a multi-segment trip needs a specific amount of available time to rest to fly the multiple segments.	
The FAA agrees that short flight segments will not permit a flightcrew member to sleep. Thus, too many flight segments, even within an extended FDP, would not allow a meaningful sleep opportunity for the flightcrew. The FAA is proposing that a certificate holder not schedule an augmented crew pairing with more than three segments (including FDPs that include required technical stops such as stopping for fuel or to clear customs). In addition, two consecutive hours must be available for in-flight rest for the flightcrew member manipulating the controls during landing; a 90-minute consecutive period must be available for in-flight rest for each flightcrew member; and the last flight segment must provide a two consecutive hour rest period. The proposed requirement for the 2-hour rest opportunity on the last flight segment is designed to address a common recognition among the ARC members that, even on a flight with only two segments, the last segment is	

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often of such duration that there is no realistic rest opportunity, even though this is when the crew is likely to be the most fatigued. The ARC discussed the qualifications of the relief flightcrew member used in augmented operations. Some ARC members emphasized that there must be one type-rated flightcrew member on the flight deck at all times. One ARC member noted that current regulations require only one type-rated flightcrew member on the aircraft. Another ARC member stated that under no circumstances should a flight engineer serve as a relief flightcrew member. The ARC proposed that at least one flightcrew member type-rated in the aircraft be on the flight deck at all times. The ARC largely deferred to the FAA in deciding whether to allow augmentation based on the presence of a flight engineer. As mentioned earlier in this section, the FAA does not believe a flight engineer may serve as a relief flightcrew member unless he or she is qualified as a PIC or SIC and type rated. The purpose of a relief flightcrew member is to have someone available to help fly the airplane when another flightcrew member is at rest. In order for him or her to do this, the relief flightcrew member must know how to actually operate the aircraft.	
The FAA seeks comment on the following: (15) (a) Should augmentation be allowed for FDPs that consist of more than three flight segments? (b) Does it matter if each segment provides an opportunity for some rest?	15(a) Absolutely, LAC does not see any scientific research that indicates any “magic” number of flight segments makes a difference on the benefit of an appropriate rest period. 15(b) No, while we agree that the longer the period, the more beneficial the rest, there is scientific evidence that any rest, free from duty, is beneficial and should be credited
(16) Should flight time be limited to 16 hours maximum within an FDP, regardless of the number of flightcrew members aboard the aircraft, unless a carrier has an approved FRMS?	We strongly disagree with any attempt to limit flight time with the maximum FDP’s

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(17) (a) Should some level of credit be given for in-flight rest in a coach seat? (b) If so, what level of credit should be allowed? Please provide supporting data.	17 (a) Absolutely, the method to ensure sufficient rest used by LAC establishes that any time free from duty with the ability to obtain rest should be given credit in an augmented crew setting. 17(b) LAC concurs with NACA recommendations.
(18) Is there any reason to prohibit augmentation on domestic flights assuming the flight meets the required in-flight rest periods proposed today?	18 No, any proposal must be supported by evidence; this appears to be a labor issue and has no place in rulemaking.
(19) Are the proposed required rest periods appropriate?	19 No, the proposal fails to recognize that all rest should be credited.
(20) Should credit be allowed if a flightcrew member is not type-rated and qualified as a PIC or SIC?	Yes, credit should be allowed in all cases and particularly for the flight engineer. Flight engineers are an integral part of the LAC flight crew; they train with the flight crew, creating exposure to the same CRM and TEM training and will be trained under LAC's FRMP.
2. Split Duty Rest The concept of allowing mitigation for split duty sleep is similar to that for augmentation, in that a crewmember can regenerate to some extent because of the ability to sleep for a period of time during his or her FDP. In fact, the quality of the sleep facility may be significantly better than the quality of a sleep facility aboard an aircraft. However, the initial theory behind augmentation was that it was impossible to simply place a fresh crew aboard the aircraft. While that may be true in some instances where split duty rest is contemplated, it is not universally true. In any case, current regulations provide no incentive for a carrier to provide its flightcrew members with a rest opportunity outside of the mandatory rest requirements. Nevertheless, some carriers have spent considerable amounts of money developing rest	

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facilities for their employees, and others provide hotel rooms, even though not required by the FAA. Carriers have taken these steps recognizing that, even though not required, providing the rest facilities increases the level of safety. The ARC discussed the concept of split sleep with the sleep specialists to assess the value of the type of rest obtained on a split duty trip. The scientists noted that split sleep is an area of intensive work. All other factors being equal, if the total amount of actual sleep is the same, split sleep is theoretically as valuable as continuous sleep. However, the presenters noted that the value of sleep is impacted by where it falls in the circadian cycle. They stated that split sleep with 4 hours sleep during a circadian night is better than 8 hours of continuous sleep during the day. However, the larger portion of split sleep ideally would fall during the WOCL, and they reiterated that split sleep with a component at night is better than consolidated sleep during the day. This is because the ability to sleep effectively is diminished during daytime hours because it is very difficult to get continuous sleep during this time. They also stressed that actual sleep is important, and noted that a 4-hour sleep opportunity may only net 2 hours of actual sleep.	
The ARC discussed extending the FDP based on the opportunity for sleep during the duty period and the mitigations needed to extend the FDP. These mitigations would apply to split duty trip pairings (including continuous duty overnights, also known as CDOs), in which a flightcrew member has a downtime of several hours between flights within the same FDP. Some members of the ARC rejected the concept of a regulatory credit for split duty sleep, while others noted that it is fully consistent with the concept of extending FDPs based on augmentation. The ARC considered allowing a certificate holder to extend the FDP up to 50 to 75 percent of time that a	

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flightcrew member spent resting in a suitable accommodation up to a maximum FDP of 12 to 13 hours as long as certain conditions were met. First, the sleep facility should be a single occupancy, temperature-controlled facility with sound mitigations that provide a flightcrew member with the undisturbed ability to sleep in a bed and to control light. Second, the flightcrew member must be given an actual, not simply scheduled, sleep opportunity in the suitable accommodation. Some ARC members also suggested that there should be a requirement that the sleep facility be approved by the FAA, there be an employee feedback process to assure the facilities were adequate, and that the opportunity for rest coincide with the flightcrew member's circadian rhythms. The FAA is proposing to permit credit for split duty sleep consistent with the proposal presented by those members of the ARC supporting credit. A reasonable sleep opportunity must actually be provided (as opposed to simply scheduled), and the sleep facility must be adequate to reasonably allow sleep. A carrier could extend an FDP by 50 percent of the actual available sleep opportunity if it provides at least 4 hours sleep opportunity. However, the FDP could not be extended beyond 12 hours. The sleep opportunity is calculated from the time the flightcrew member actually reaches the sleep facility, rather than when it is scheduled. This is because a scheduled sleep opportunity may be reduced considerably if there are delays or an unanticipated need for further aircraft movement. As with all other instances when transportation to or from a rest facility is involved, the period of time engaged in transportation does not count as duty, but it also does not count as rest. The rest facility must be adequate to reasonably permit the flightcrew member with an opportunity to rest. To that end, it must be quiet, temperature-controlled, and light-controlled. The FAA considered whether to require that it also be a single occupancy facility. The agency has tentatively decided against such a requirement because it understands that there are	

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currently facilities where there may be more than one bed per room, and it believes this is fundamentally a labor-management issue. Flightcrew members regularly spend the night near their home base in houses or apartments where there may be multiple beds in a single room. If this dormitory-type housing is sufficient for full rest periods, it should, from a regulatory perspective, be sufficient for a split rest facility.	
The FAA seeks input on the following: (21) Please comment on whether a single occupancy rest facility provides a better opportunity for sleep or a better quality of rest than a multiple occupancy facility such as a multi-bed crew sleeping facility or multi-bed living quarters. Please provide supporting data.	While a single occupancy rest facility may be optimum, LAC's history supports the fact that any facilities, including on-board provisions provide substantive opportunities for fatigue mitigation. LAC performs many operations at remote and sometimes uninhabited areas that do not and will not ever have single occupancy rest facilities.
H. Consecutive Nighttime Flight Duty Periods There was a discussion among ARC members on whether there should be a limitation on the number of consecutive nights that a pilot could fly, based, in part, on a presentation to the ARC that performance falls off under the SAFTE/FAST model after the third night. Currently the FAA places no restrictions on the number of allowable consecutive nighttime operations, as long as the crewmember receives 24 consecutive hours free from duty in a 7-day period. CAP-371 provides a scheme whereby flight duty periods are reduced based on the number of previous consecutive nights flown. The FAA is unaware of the basis for this scheme, and it is not readily apparent from a reading of the requirement. Modeling indicates that consecutive nights of nighttime work will lead to a decrease in productivity over a relatively short period of time (approximately 3 days). The modeling notes a steady deterioration in performance because it	

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is very difficult for most people to sleep effectively during the day. The members of the ARC who had flown nighttime operations generally agreed that the first night of multiple nighttime operations was the most difficult because they were unaccustomed to being awake all night.	
During the ARC discussion, the cargo contingent of the part 121 community asserted that if one changes the assumption in the SAFTE/FAST model and assumes that one can train oneself to sleep effectively during the day, it may be possible to work more consecutive nights without a significant degradation in performance. This may be particularly true if an individual is provided an opportunity to sleep during the night while packages are being sorted from one plane to the next. The cargo carriers asserted that higher levels of sleep pressure brought on by the longer period of wakefulness on day one of the pairing act to offset the general inability to sleep effectively during the day, particularly when people have been trained to understand the need to take advantage of the sleep pressure to improve their ability to sleep during the day. The FAA has asked Dr. Hursh, who developed the SAFTE/FAST model, to input these assertions into the model. Dr. Hursh determined that, given a sufficient sleep opportunity at night, a person can sustain his or her performance at acceptable levels for five consecutive nights. However, the smaller the nighttime sleep opportunity, the lower level of performance, particularly by night five. In addition, training on how to maximize sleep opportunities is critical because an individual needs to get enough sleep during the day to make up for the nighttime sleep deficit. A copy of Dr. Hursh's analysis has been placed in the docket for this rulemaking. The FAA has decided to take a comprehensive approach towards consecutive nighttime operations that it believes addresses the concerns by both contingents within the ARC. The agency proposes to permit consecutive nighttime flying, constrained only by 30-hour consecutive rest required for	These paragraphs assume that the flightcrews are not chosen for the unique operation. The assumption that a person is not able to sleep during the day is based upon “normal” individuals that are not acclimated to the particular operations. The low turnover in LAC’s flightcrews coupled with its safety record is evidence that appropriate measures can be taken by a small operator to ensure proper rest is afforded in unusual operations.

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any 168-hour period, as long as there is an opportunity to rest in a suitable facility during the flight duty period. As proposed, this sleep opportunity would have to comport with the proposed split duty requirements for extending a flight duty period. Should no such opportunity be provided, a carrier could not assign a flightcrew member to more than three consecutive nightime FDPs. While this approach is more restrictive than currently permitted, it permits cargo carriers who provide adequate rest facilities to continue their current operations. It also assures that flightcrew members are given an opportunity for limited nighttime rest. The FAA has concerns that simply limiting nighttime operations to three consecutive nights could result in a significant increase in the number of first night operations, since presumably carriers will not change the nature of their operations, but simply will schedule more multiple-night crew pairings to accommodate the existing operations. Thus, a flightcrew member who is currently assigned two 5-night pairings in a 2-week period could potentially be assigned three 3-night pairings in the same 2-week period, increasing the risk associated with the first night of operations by 50 percent during that timeframe. Certainly long-standing industry practice has been to fly more than three consecutive nights. The FAA is concerned that taking an approach that may appear safer in modeling could lead to adverse safety impacts in the real world. The ARC contingent advocating restrictions on consecutive night flight duty periods suggested a fourth night was acceptable as long as a 14-hour rest was provided between nights three and four. The FAA notes that a 14-hour rest opportunity would limit a flightcrew member to a maximum 10-hour duty period, excluding the time required for local commuting. The FAA is not sure that this approach would provide a meaningful FDP for the fourth night.	

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The FAA requests input on the following: (22) Should there be any restriction on consecutive nighttime operations? If not, why?	There should be no restrictions; the only restriction should be that which directly impacts the individual flight crew member. This is particularly true for operations in the State of Alaska, Northern Canada and other northern hemisphere locations where “night” and “day” take on a different meaning during the year. LAC has a proven history of multiple “nighttime” operations. Unless the FAA wishes to redefine “night” this prescription would make no sense whatsoever.
(23) If the nighttime sleep opportunity is less than that contemplated under the split duty provisions of this notice, should a carrier be allowed to assign crew pairing sets in excess of three consecutive nights? Why or why not?	As stated above, there should be no restriction to multiple night operations.
(24) If the nighttime sleep opportunity meets the split duty provisions of this notice, should the carrier be allowed to extend the flight duty period as well as the number of consecutive nighttime flight duty periods? Why or why not?	As stated above, there should be no restriction to multiple night operations.
(25) Should a fourth night of consecutive nighttime duty be permitted if the flightcrew member is provided a 14-hour rest period between nights three and four?	As stated above, there should be no restriction to multiple night operations.
I. Reserve Duty While the term “Reserve” has been used for years in the air carrier industry, the term is not addressed at all in part 121. The agency has issued 11 legal interpretations on the subject of reserve, which range from examples of whether a crewmember is on duty and, if applicable, whether the required rest associated with that duty period is impeded by being in a reserve status.	

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The ARC discussed various definitions of reserve and initially proposed that reserve means that a pilot that does not have a regular flying schedule and is available for flight when contacted by the company. That pilot has no telephone or reporting responsibility to the company. The ARC refined the definition of “reserve” to read “a flightcrew member that is required by a certificate holder to be available to receive an assignment for duty.” In addition, the ARC established the following types of reserve duty: Long-call, short-call, and airport/standby. The ARC noted that the policies that apply to reserve flightcrew members vary significantly between certificate holders, but also found that there are some relatively consistent conditions. CAP-371 places restrictions on “Standby Duty”, which is generally the equivalent of short-call reserve discussed below. When standby duty is undertaken at home, or in a suitable accommodation provided by the operator, during the period 2200 to 0800 hours local time and a crew member is given 2 hours or less notice of a report time, the allowable FDP starts at the report time for the designated reporting place. EASA recognizes “standby duty”, but does not place any regulatory restrictions on this type of duty. Reserve duty is inherently based on unpredictable events, such as covering trips for flightcrew members who become ill, have difficulty traveling to the airport for an assignment because of weather or other reasons, or are stranded due to severe weather creating flightcrew member shortages throughout a certificate holder's system. The very nature of reserve duty makes injecting predictability into a reserve flightcrew member's schedule a challenge. The ARC set a goal to make reserve duty as predictable as possible, and to manage fatigue as much as possible. The proposal on how to address reserve limits was one of two areas of consensus by the ARC. The ARC concept	

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includes defining limits associated with flight duty period, duty period and rest limitations. One of the most fatiguing elements of reserve duty is the lack of predictability. Unlike a flightcrew member who has a set schedule (a line-holder), a flightcrew member on reserve may spend several hours on-call and then, once called, be expected to report to the airport ready to commence his or her duty day. The lack of predictability means the reserve crewmember cannot schedule naps or otherwise control his or her sleep opportunities to assure the reserve crewmember is adequately rested when he or she reports to work. The ARC asked the sleep specialists what impact this lack of predictability has on a reserve flightcrew member compared to a line-holding flightcrew member. The presenters responded that depending on when a reserve flightcrew member is called and how much notice is given, he or she may not have the same opportunity to nap that a line-holder would have, because the line-holder would know about the trip and could plan his or her rest accordingly. A reserve flightcrew member also might not nap, even if he or she thought a call was unlikely, because this uncertainty may disrupt his or her sleep schedule. The ARC asked the scientists how a reserve flightcrew member could best prepare for a potential assignment, without knowing when he or she may be called. They recommended a normal night's sleep through the WOCL and a late afternoon nap in the minor WOCL. The ARC also asked the presenters if there was a maximum duty time that should be set for reserve duty. The scientific presenters noted that the ability to successfully manage time-on-duty is dependent on rest. If 8 hours sleep in the WOCL is available, then 16 hours of duty is theoretically possible. Short-Call and Airport/Hotel Standby Reserve	

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Airport/standby reserve is known by several terms among various certificate holders, but ultimately involves a flightcrew member on call at an accommodation or other facility at or near an airport. The flightcrew member is not at home and is not resting. The purpose of such reserve duty is to have an available flightcrew member close to the operation in case of a schedule irregularity. Flightcrew members on these assignments can receive notice to report to work in as little as 1 hour before departure time, requiring them to be in a constant state of readiness. Because of the unique nature of these assignments, and the fact that the flightcrew member is not resting, an airport/standby reserve assignment is considered to be an FDP, regardless of whether a flying assignment is ultimately received by the flightcrew member. Short-Call Reserve A short-call reserve flightcrew member typically receives an assignment on relatively short notice, meaning he or she would not be provided an adequate time for a legal rest period before reporting for duty. Report times are typically within two to 3 hours from notification. Short-call reserve differs from airport/standby reserve in that the flightcrew member is likely to be at home and available for contact by the certificate holder, rather than at the airport or a hotel actively awaiting an assignment. Although the flightcrew member may be at home, the opportunity for sleep before reporting for duty cannot be guaranteed. Therefore, the ARC deemed a limit on the amount of time spent on short-call reserve duty as necessary. The ARC noted that a number of variables may impact the maximum FDP for a short call reserve. These variables include: • Timing of on-call period within a circadian day. Where an on-call period starts in relation to standard circadian rhythms can affect alertness and state of rest. Generally, short call availability periods may be classified as	

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very early morning, daytime, or night. The ARC considered that daytime reserve flightcrew members can be presumed to be well-rested and alert at the start of their reserve period because they can get a regular night's sleep. For the other classifications, circadian factors may make flightcrew members less alert and rested than those on daytime reserve. One ARC member suggested that flightcrew members called to report during overnight hours should have a reduced maximum FDP. • Length of on-call period. Not all carriers have the same reserve policies. Some certificate holders have relatively short on-call periods, lasting only a few hours, while other certificate holders may require flightcrew members to be on call for 12 hours or more. • Timing of call and report time in relation to on-call period and length of duty day. One ARC member noted that during an on-call period, the time the flightcrew member is called and the time the flightcrew member is expected to report may affect the flightcrew member's alertness and rested state (e.g., called at 5 a.m. to report at 3 p.m. vs. called at 10 a.m. to report at noon). • Recent on-call history. The ARC noted that reserve flightcrew members with on-call schedules often change schedules from day to night, or vice-versa, within a short period of time. Such changes, especially if given with short notice, can result in reserve flightcrew members failing to obtain proper rest before their on-call periods.	
Long-Call Reserve Long call reserve pilots are given relatively substantial advance notice of when they are to fly. This notice may be from 9 hours to over 24 hours. A long-call reserve flightcrew member typically receives an assignment for duty well in advance and will have a sleep opportunity before reporting for duty, and may have enough notice of the assignment to plan his or her rest	

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accordingly. The ARC recognized, however, that depending on the timing of notice and the report time in relation to circadian rhythms, reserve flightcrew members may not be able to obtain a full 8 hours of sleep, despite the opportunity to do so. The lack of predictability of when the flightcrew member will be required to report for duty makes it difficult for the reserve flightcrew member to plan ahead in his or her sleep rest cycles. The ARC considered two reserve systems developed by working groups consisting of ARC members representing industry and labor groups. One working group proposed a WOCL Aware Reserve System to the ARC. Some key points of the system are as follows: • Any reserve flightcrew member called between 2200 and 0600 will receive a minimum of 10 hours of rest before reporting for duty. • Any reserve flightcrew member called to fly into the WOCL would have to be contacted within the first 6 hours of his or her reserve duty. If normal sleep time is not interrupted and a reserve flightcrew member is not being called to fly into the WOCL, he or she would have the same FDP limit as a line-holder because they received similar rest.Airport/standby reserve is to be treated like a trip assignment and is considered as an FDP. No part of airport/standby reserve may be considered rest, even if the flightcrew member is at a hotel. The proposal for a Predictable Reserve System with Circadian Stability (Predictable System) is based on three prongs: Science, circadian stability, and adequate rest. The proposal incorporates provisions from CAP 371, and provides some recommendations from a reserve rest ARC that convened in 1999. The second proposal contained the following elements: Reserve Limits	

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• Created several definitions applicable to reserve including ``reserve availability period'' (RAP), “reserve duty period” (RDP), “short call reserve”, and “long call reserve.” • Maximum RDP is 16 hours. • Maximum reserve availability period (RAP) for short call reserve is 14 hours. • Carrier receives half credit for not calling a reserve crew member on phone availability between 0000 and 0600; maximum 3 hours. Shifting RAP • Later--12 hour maximum in any 168 consecutive hours. • Earlier--3 hour maximum into the WOCL; 5 hour maximum otherwise. • Not allowed on consecutive days. Concerns were expressed regarding individuals on phone availability being called during the window of circadian low. However, it was noted that based on scientific modeling, for a reserve called during the window of circadian low, a 4-hour lookback (the period in which the carrier must contact the reserve from the start of the RAP to use the entire available FDP) actually would be better than the 6-hour lookback originally proposed under the WOCL Aware proposal. A scenario was also posed of a pilot with a RAP starting during the window of circadian low, but not called until after the window of circadian low had passed. It was proposed that some credit be given for the sleep obtained before being called. After brief discussion, the ARC decided to move forward with a maximum FDP limit of 16 hours after the start of the RAP. After considering the above proposals and other discussions, the ARC proposed the following requirements for reserve duty:	

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"Scheduled" is defined as times assigned by a certificate holder when a flightcrew member is required to report for duty. "Assigned" is defined as scheduling by a certificate holder when a flightcrew member is required to report to duty. Airport/standby reserve counts as part of the flightcrew member's FDP. RAP and RDP only apply to short call reserve. The maximum RDP for un-augmented operations is the flightcrew member's possible FDP under the FDP table plus 4 hours, or 16 hours, whichever is less. The maximum RDP for an augmented flight crew is the flightcrew member's possible FDP under the augmented FDP table plus 4 hours. A carrier receives half credit for not calling a reserve crew member on phone availability between midnight and 6 a.m. up to a maximum of 3 hours (e.g., if the crew member is on reserve starting at 1 a.m., but isn't called until 3 a.m., the RAP is extended by 1.5 hours). A short-call reserve duty period in which the crewmember is not called to report to work may not exceed 14 hours. Conversion from long-call to short-call reserve assignment must be preceded by a legal rest period. A long-call reserve flightcrew member must receive a legal rest prior to reporting for duty and at least 12 hours notice of an assignment of a trip	

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pairing that will extend into the window of circadian low. A reserve flightcrew member's RAP may be shifted under the following conditions: • A shift to a later RAP may not exceed 12 hours. • A shift to an earlier RAP may not exceed 5 hours, or if the shift will move the availability into the flightcrew member's window of circadian low, it may not exceed 3 hours. • A shift to an earlier RAP may not occur on consecutive days. • The total amount of shift in RAPs for a flightcrew member may not exceed 12 hours (regardless of direction) in any 168 consecutive hour period. Tables E(1) and E(2) are visual depictions of the maximum RAP discussed above based on the two FDP tables contemplated by the ARC.	

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TABLE E(1) –FLIGHT DUTY PERIOD RESERVE: TWO FLIGHT CREW MEMBERS, OPTION 1

Time of start (Home base)	Maximum flight duty period reserve (hours) based on number of flight segments						
	1	2	3	4	5	6	7+
0000-0359	13	13	13	13	13	13	13
0400-0459	14	14	13	13	13	13	13
0500-0559	15	15	15	15	14	13.5	13
0600-0659	16	16	16	16	15	15	14.5
0700-1259	16	16	16	16	16	16	15
1300-1659	16	16	16	16	15.5	15	14.5
1700-2159	15	15	14	14	13.5	13	13
2200-2259	14.5	14.5	13.5	13.5	13	13	13
2300-2359	13.5	13.5	13	13	13	13	13

TABLE E(2) –FLIGHT DUTY PERIOD RESERVE: TWO FLIGHT CREW MEMBERS, OPTION 2

Time of start (Home base)	Maximum flight duty period reserve (hours) based on number of flight segments						
	1	2	3	4	5	6	7+
0000-0159	13	13	13	13	13	13	13
0200-0459	14	14	14	14	13	13	13
0500-0659	16	16	16	16	15.5	15	14.5
0700-1259	16	16	16	16	16	16	15.5
1300-1659	16	16	16	16	15.5	15	14.5
1700-2159	15	15	15	15	13	13	13
2200-2259	14.5	14.5	14.5	14.5	13	13	13
2300-2359	13.5	13.5	13.5	13.5	13	13	13

Because this was one of only two ARC consensus areas, the FAA has decided to propose the ARC recommendation with only a few changes.

First, the agency has decided against adding Table E to the regulatory text. The agency believes the regulatory text is sufficiently clear. Also, the table does not include the credit that could be given for not calling during the reserve crew member's window of circadian low and could be misleading. Carriers (and the pilot associations) are of course free to draft whatever tables they think are helpful to understand the regulatory requirements.

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Second, the ARC did not consider time within the RAP to be duty. However, the FAA believes that it may be appropriate to designate time spent in a short-call reserve status as duty. While in a short-call reserve status, the crewmember can expect that he or she will not receive an opportunity to rest prior to commencing a flight duty period. The crewmember also is required to limit his or her actions sufficiently so that he or she can report to his or her duty station within a fairly short timeframe. Accordingly, the FAA believes this time needs to be accounted for within the cumulative duty limits discussed later in this document. While the FAA is proposing the ARC recommendation on reserve, it also notes some concern with the level of its complexity. The agency is particularly concerned that the partial credit given for not calling during the window of circadian low will be difficult to implement. It may make more sense to simply assign a credit for not calling during the window of circadian low. The agency also has some concern that the RDP for augmented operations could extend to 22 hours. While there would be some opportunity to rest on board the aircraft, this proposal would permit some reduction in the overall rest opportunity.	
The FAA seeks comment on the following: (26) Please comment on whether a 16 maximum hour FDP for long call reserve is appropriate when the maximum FDP for a lineholding flightcrew member is 13 hours.	Yes, particularly since long call reserve, by definition, is not duty, therefore no comparison should be drawn between the two.
(27) Please comment on whether the proposed maximum extended FDP of 22 hours for an augmented flightcrew member is appropriate. If not, please provide an alternative maximum FDP.	Yes, the concept of augmented crew provides for rest facilities which have already been deemed adequate for extended FDP.

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(28) Please comment on whether a certificate holder should receive credit for not calling a flightcrew member during the WOCL while on reserve.	Absolutely, indeed, it should be full credit not partial. It must be assumed that the crewmember is sleeping during the WOCL.
(29) Should minimum required rest while on reserve status be greater than the amount of rest required for a lineholding flightcrew member? If so, please provide supporting data, if not, please provide rationale.	No, indeed, this question defies the ability to provide a logical response, although NACA was able to make some sense out of it, so please refer to the association's comments.
(30) Please comment on the level of complexity on the proposed reserve system.	It is highly complex and that would be true for scheduled operations to which it is directed. Non-scheduled airlines in general and LAC specifically, are double-taxed into a crew augmentation regime. Again, the carrier and its flightcrew are in the best position to understand what it takes to ensure proper fatigue mitigation. When flightcrews are chosen for the ability to adapt to unusual day/night patterns, there is neither scientific nor an economic case to be made to force LAC to retrofit its unique aircraft (the L382-G) with rest quarters.
J. Cumulative Duty Periods The FAA's current regulations do not impose a cumulative restriction on duty, although as a practical matter, a flightcrew member engaged in domestic operations is effectively limited to a 16-hour duty day and all flightcrew members are entitled to 24 consecutive hours free from duty during a 7-day period. Rather, the FAA has historically placed limitations on the number of flight hours a flightcrew member may be assigned on a daily, weekly, monthly, and annual basis. Depending on whether one is operating under domestic, flag or supplemental rules, flight time is limited to 30-32 hours a week, 100-120 hours a month, 300-350 hours a quarter, and 1,000 hours a year. CAP-371 and EU-OPS subpart Q impose more restrictions on cumulative duty, with weekly limits ranging from 55 to 60 hours, biweekly limits of 95 hours (CAP-371 only), and slightly less than monthly limits of 190 hours (calculated	

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against 28 days rather than an actual month). The ICAO SARP recommend that member states restrict duty hours within any seven consecutive days or a week and 28 consecutive days or a calendar month. Scientific studies suggest that long periods of time on duty infringe upon an individual's opportunity to sleep, thus causing a ``sleep debt'' which is also known as cumulative fatigue. Some conclusions are based on experiments in sleep labs, and there is limited data either supporting or refuting that the amount of cumulative duty has a direct effect on cumulative fatigue. Despite the lack of validated data, the FAA believes it is appropriate to take a conservative approach and is proposing to impose cumulative limitations on duty, flight duty periods, and flight time. Not only are cumulative limits consistent with current regulations here and abroad, but they offer protections against practices common in the aviation industry, where pilots commonly work more than an 8-hour day, often at varying times in a single week. The FAA proposes to set maximum duty limitations, flight duty periods, and flight time (block) periods based on specific time intervals. Fewer hours on duty can be equated to more opportunity for rest, which can mitigate the amount of cumulative fatigue experienced by a flightcrew member. The proposed limits decline over extended periods of time, i.e., the 28-day limits are less than four times the weekly limits. This approach would allow flightcrew members to work long hours over a relatively short period of time, but prevent long duty periods over extensive lengths of time. The ARC defined duty as “ny task that crewmembers are required by the certificate holder to perform including, but not limited to: Flight duty, administrative work, ground training, ancillary training, positioning, and airport standby.” The FAA believes this definition appropriately details the type of work commonly required of crewmembers except that, as discussed	

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earlier, it believes that time spent on short-call reserve should apply to the cumulative duty limits proposed today. Under today's proposal, duty time would be limited to 65 hours in any consecutive 168-hour period (7 days) and 200 hours in any consecutive 672-hour period (28 days). The FAA is proposing consecutive hourly limits that equate to 7 and 28 days because the current requirements assume that a day starts just after midnight, which is an arbitrary constraint that does not work well for carriers. As a result, carriers have been allowed to define when their ``day'' begins. This approach is unwieldy. As a practical matter, the FAA expects that carriers and flightcrew members will base their "week" on the time the flightcrew member reported for duty after completing his or her extended rest period. The weekly limit could be extended by up to 10 hours to 75 hours during a rolling 168 hours and the 28-day limit could be extended to 215 hours if the duty period includes deadhead segments in a rest seat outside the flight deck meeting or exceeding the provisions of class 2 rest facility.	
Allowing an additional 10 hours duty time for non-FDP deadhead flights when adequate sleeping accommodations are provided seems to be a reasonable accommodation to that sector of the industry that relies on deadheading to position pilots to areas outside of the U.S. Since the extension is limited to no more than 10 additional hours, there should be sufficient fatigue mitigation. Since short-call reserve periods are tentatively considered to be duty, the FAA also believes it is appropriate to allow carriers to increase the maximum cumulative duty periods to account for the time spent on short-call reserve, while still recognizing that time spent on reserve is less strenuous than time	

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actively spent on duty. The FAA also notes that it may be appropriate to provide the same accommodation to management personnel. The rationale for allowing longer duty periods based on deadhead segments centered on the fact that deadheading in a ``rest seat'' provided mitigation in the form of an opportunity to rest; office work would not allow for such mitigation, but limiting the duty period to 65 hours a week for management could have an adverse safety impact (e.g., force flying shorter, unaugmented flights) since the management workload likely will not be reduced. The extension of the maximum duty limit would only be extended by the amount of time spent engaged in the type of duty allowing for an extension. Thus, if a flightcrew member spent 5 hours on short-call reserve, the maximum weekly duty period would only be extended by 5 hours, to a total of 70. The proposed cumulative limitation on flight duty periods is largely consistent with the approach already adopted by the British and EASA. Specifically, the ARC recommended that flight duty period be limited to 60 hours in any consecutive 168 hours (7 days) and 190 hours in any 672 consecutive hours (28 days). The ARC decided there was no need to implement a biweekly requirement, as exists in CAP-371, instead endorsing the approach adopted by EASA. The FAA agrees that a weekly and monthly approach sufficiently mitigates the effects of cumulative fatigue and is proposing the limits suggested by the ARC. The FDP is a sub-set of duty, and the maximum FDP limits are subsumed within the maximum duty limits. To the extent any duty other than that encompassed in the definition of a FDP cannot be completed within the time dedicated to non-FDP duty (typically 5 hours a week or 10 hours in a 4-week period), the amount of FDP is	

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correspondingly reduced. Thus, during a 168-hour period, if a flightcrew member spent 30 hours in ground training, the available amount of FDP for that period would only be 35 hours. “Flight time” retains the meaning in 14 CFR 1.1. While the ARC largely agreed on a 100 hour limitation in any 672 consecutive hours (28 days), it was unable to agree on a maximum annual limit. Some argued that the constraints on cumulative duty and flight duty periods obviated the need for any limit. This argument was particularly strong with regard to annual limits on flight time. However simple calculations of the proposed weekly and 28-day limits revealed that absent an annual limit, a flightcrew member could potentially accrue as many as 2,000 flight hours in a 12-month period. Based on this assessment, those arguing against any limit conceded that some annual limit may be appropriate, but that in any case the current limit of 1,000 hours per year could be relaxed to 1,200 hours. Others argued that the current annual limit is too high and urged the FAA to consider a 900 hour limit. The FAA has tentatively decided to retain the current annual flight time limitation of 1,000 hours in any 365 consecutive days because the ARC members were unable to agree and the current limit is within the limits presented by the ARC.	
(31) The FAA seeks input on the appropriate cumulative limits to place on duty, flight duty periods and flight time. Is there a need for all the proposed limits? Should there be more limits (e.g., biweekly, or quarterly limits)?	Yes, although we strongly disagree with the scientific “validity” or the necessity for any type of limit, LAC could concur with the concept of cumulative limits for 168 and 30 days based on FDPs only. Please refer to NACA comments in this regard.
(32) The FAA also asks for comments on measuring limits on an hourly rather than daily or monthly basis. Does this approach make sense for some time periods but not for others?	No.

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K. Rest Requirements 1. Pre-Flight Duty Period Rest Adequate rest is the most critical component of fatigue mitigation. As such, it is critical that the FAA implement unambiguous rest requirements that address both the potential for fatigue on a daily basis and the risk posed by cumulative fatigue. Currently, 14 CFR part 121, subparts Q, R and S address rest limits within a 24-hour period. However, certificate holders conducting operations with airplanes having a passenger seat configuration of 30 seats or fewer and a payload capacity of 7,500 pounds or less, may comply with the less stringent requirements of 14 CFR sections 135.261 through 135.273. Perhaps the largest problem with the existing regulations is that there is no mechanism to assure that rest is provided prior to flight, and there is no guarantee that the 9-hour rest requirement results in 8 hours of actual sleep opportunity. In addition, the existing requirements do not adequately apprise the regulated community on what constitutes being free from duty. The FAA has issued 55 legal interpretations regarding rest that apply to pilots, flight attendants and dispatchers, many of which relate to whether a crew member is at rest when required to answer phone calls or pagers or otherwise be in contact with the carrier. CAP-371 defines rest as a period of time before starting a flight duty period which is designed to give crew members adequate opportunity to rest before a flight. The minimum rest period must be as long as the preceding duty period, or 12 hours, whichever is greater. After being called out from reserve, the length of minimum rest is determined by the length of reserve duty, time spent on positioning, and any completed FDP.	

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EASA defines a rest period as a continuous and defined period of time, subsequent to and/or prior to duty, during which a crew member is free of all duties. Certificate holders are required to ensure that rest periods provide sufficient time for flightcrew members to overcome the effects of the previous duties and be well rested for the next FDP. In addition, a certificate holder must ensure that the effects on a flight crew passing through different time zones are compensated for with additional rest. As is the case with CAP-371, the EU OPS subpart Q requires that minimum rest for an FDP beginning at home base must be at least as long as the preceding duty period or 12 hours, whichever is greater. If the FDP begins away from home base, the rest must be as long as the preceding duty period or 10 hours, whichever is greater. Within this rest period, a certificate holder must provide at least 8 hours of opportunity for sleep. EU OPS subpart Q also requires certificate holders to increase the minimum rest periodically to a weekly rest period. The pilot-in-command also may reduce rest in the event of unforeseen circumstances. As discussed earlier, the study of sleep science is somewhat settled on the following points: The most effective fatigue mitigation is sleep; an average individual needs to have an 8-hour sleep opportunity to be restored; 8 hours of sleep requires more than 8 hours of sleep opportunity; and daytime sleep is less restorative than nighttime sleep. For most people, 8 hours of sleep in each 24 hours sustains performance indefinitely. There is a continuous decrease in performance as sleep is lost. Examples of this reduction in performance include complacency, a loss of concentration, cognitive and communicative skills, and a decreased ability to perform calculations. All of these skills are critical for aviation safety.	
The scientific presenters stated that during long pairings with significant time zone shifts, a minimum of 24 hours off would be necessary for flightcrew	

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members to find an adequate sleep opportunity, and sufficient time free from duty. A minimum of two nights of sleep might be necessary to acclimate to a different time zone. The scientific presenters noted that an individual's circadian clock is sensitive to rapid time zone changes. They added that long trips present significant issues requiring mitigation strategies. Twenty-four or 48 hours of rest may not be adequately restorative during a trip pairing where a flightcrew member is working 20 days separated by 24-hour layovers. In some cases, shorter rest periods, such as 18 hours or less, may be more restorative because of circadian issues. In defining a rest period, the ARC included the condition that a flightcrew member be free from all contact during a rest period. The proposed definition means that the certificate holder cannot contact a flightcrew member nor can the flightcrew member be required to contact the certificate holder during a rest period. The ARC members agreed on a general approach towards rest without agreeing on the number of hours one needed to be free from duty to assure an 8-hour sleep opportunity. On the lower end, they developed a domestic rest requirement of 10 hours by working out in each direction from an 8-hour sleep opportunity, with 30 minutes on each end for transportation, and 30 minutes on each end for physiological needs such as eating, exercising and showering. Others on the ARC noted that a longer rest period was required to assure an 8-hour sleep opportunity. For international operations, some members of the ARC suggested this rest requirement should increase to 12 hours. They noted that flightcrew members may require a longer rest period at international layovers because	

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of issues with time zone changes and possible difficulties obtaining sleep because the flightcrew member is non-acclimated. There were also concerns raised with a potential for increased stress associated with communicating with air traffic control in countries where English is not the native language. Some ARC members acknowledged that the minimum period captures the same elements as the 10-hour requirement discussed above but includes an additional 2 hours to transit customs and immigration or travel a long distance to hotel accommodations in foreign destinations. The ARC discussed permitting the minimum rest time to be reduced to a lower level due to unforeseen circumstances. On the one hand, this would allow the carrier to recover a schedule; on the other hand, the need for reduced rest may be based on factors, such as poor weather or mechanical problems with the aircraft, which are potentially more fatiguing than normal operations. Ultimately, the ARC members proposed to allow certificate holders to reduce a minimum rest period from 10 to 9 or 12 to 11 hours for operational flexibility in unforeseen circumstances, but to limit the number of times rest could be reduced to once in a 168-hour period. In addition, the decision to reduce minimum rest would be a joint decision between the pilot in command and the certificate holder.	
The FAA is proposing flightcrew members be provided with a minimum of 9 hours rest prior to commencing a flight duty period. The agency has tentatively decided against proposing different requirements for domestic and international operations. Time associated with clearing customs and immigration or traveling longer distances to a hotel has been addressed by refining the time at which the rest requirement begins and ends, as discussed below. While the FAA agrees that changes in time zones and the need to acclimate require additional safeguards, the agency believes that it has already accommodated that additional risk in other provisions to the	

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proposed rule. As to concerns raised with air traffic controllers who do not speak English as their primary language, the FAA is unconvinced that providing an additional 2 hour sleep opportunity after the flight has ended would have any impact on the stress associated with communicating with air traffic control after entering foreign air space. Based on the available sleep studies, it does not appear that a longer rest period immediately prior to commencing a flight in non-U.S. airspace would be necessary since presumably the flightcrew member has received the requisite amount of sleep to report to duty refreshed and well-rested. As suggested by the ARC, the rest opportunity could be reduced by 1 hour once in any 168-hour period, but only if agreed to by the pilot in command. Under no circumstances may the opportunity to rest be reduced by more than 1 hour because such reductions would seriously encroach upon the 8-hour sleep opportunity. Should the time period between the beginning of the rest period and the time the flightcrew must report for transportation to the airport be less than 8 hours, the carrier would need to delay the next day's flight or make other crewing arrangements. This proposal does not exactly mirror the ARC recommendation, because the FAA is proposing that transportation time to or from a duty station not be included in the minimum rest periods; nor would it be considered duty. Rather, the rest period would begin once the flightcrew members reach the hotel. The FAA's proposal does not change the intent of the ARC to generally assure an 8-hour sleep opportunity. However, the FAA believes that time in transit is not rest. In addition, the agency is concerned that allowing this time to be included in the rest period could result in a reduction in actual rest opportunity below 8 hours. The ARC members recognized this possibility and considered an approach whereby any time exceeding 30 minutes would not be considered in the rest period. Ultimately, the impact is the same; it is	

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simply clearer from a regulatory perspective to acknowledge that time in transit is not rest. The FAA has decided against treating this time as duty because it recognizes that the permissible amount of cumulative duty is only nominally higher than the permissible amount of FDP and that the location of a rest facility is a lifestyle issue that is typically negotiated between the carriers and their unions.	
The FAA seeks comment on the following: (33) If transportation is not considered part of the mandatory rest period, is there a need for a longer rest period for international flights?	No, if the mandatory rest period is given there should be no additional requirement. International flights are already covered in mitigation for non-acclimation.
2. Cumulative Rest Requirements Much as there should be cumulative limits on the amount of work a flightcrew member can be expected to perform in a week, there also needs to be an opportunity for rest that exceeds the amount of rest required on a daily basis. The scientific presenters to the ARC stated that cumulative fatigue is fatigue brought on by repeated mild sleep restriction or extended hours awake. They noted that the repeated infringement of duty time on the opportunity to sleep results in accumulated sleep debt and that the operative factor in recovery from cumulative fatigue is sleep. When a person has accumulated a sleep debt, recovery sleep is necessary. Recovery sleep requires an opportunity to obtain sufficient sleep to fully restore the person's ``sleep reservoir.'' Recovery sleep should include at least one physiological night, that is, one sleep period during nighttime hours in the time zone in which the individual is acclimated. The ARC discussed what would constitute rest sufficient to act as a restorative rest reset for the 168 consecutive hour rolling window. The ARC	

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noted that current regulations require 24 hours free of duty in any 7 consecutive days dependent on the type of operation. The ARC considered whether reset rest should (1) incorporate a minimum of two physiological nights' rest, which would be variable based on when the FDPs began and ended, or (2) be a fixed number of hours ranging from 30 to 48 hours. The ARC proposed that a 30 to 36 hour rest during any 168 consecutive hours constitutes a restorative rest period. Those arguing for a 36 hour rest period noted that the 30 hour period would only rarely afford one the opportunity for two physiological nights rest. Those supporting 30 hours noted that this time frame would allow for one physiological night's rest and at least one additional sleep opportunity, albeit less than a full 8 hours. The FAA is proposing to impose a 30 hour continuous rest requirement for each rolling 168-hour period. This approach does not guarantee two consecutive physiological nights rest in a 7-day period. Rather, it provides for a single physiological night rest and a rest opportunity immediately preceding or following that night. Although this is less rest than suggested by some members of the ARC, it still represents a 25 percent increase over current requirements. In addition, the FAA believes the cumulative limits on duty and FDP during the same 7-day period should adequately mitigate the effects of cumulative fatigue.	
L. Fatigue Risk Management Systems A Fatigue Risk Management System (FRMS) is a carrier-specific method of evaluating how to best mitigate fatigue based on active monitoring and evaluation by the carrier and flightcrew members. This cooperative approach has the potential to provide a cooperative and flexible means of monitoring and mitigating fatigue during operations when the prescriptive approach is not optimal. An FRMS requires a carrier to develop numerous processes and	LAC specifically requests the agency explain the difference between the "FRMS" mentioned in this rule and the Fatigue Risk Management Plan required by Congress. These requirements must be reconciled in order to avoid redundancy and confusion. LAC supplied the FAA with the plan required by Congress

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structures within an operation. These measures lead to an effective management and mitigation of fatigue on the part of both the carrier and its employees that might affect the operation. An FRMS requires that a baseline of fatigue effects be identified for the affected population, scientific modeling of respective work schedules, education and management of the process for all stakeholders, and effective evaluation and validation of the instituted policies. As a continuously improving system, the knowledge gained in developing and validating fatigue data should result in regular improvements in how the certificate holder and its employees manage and mitigate fatigue. No country has adopted FRMS as a regulatory alternative. However, ICAO is actively considering requiring member states to implement some alternative means of compliance with existing rules, and EASA has proposed requiring FRMS as an integral part of an operator's management system. Permitting FRMS as a regulatory alternative to today's proposal is widely supported by industry, with several organizations requesting that the FAA adopt FRMS as a means of addressing fatigue. Theoretically, a carrier could apply its FRMS to all of its operations. Realistically, it would likely only be used when the carrier cannot meet the more prescriptive rules because of the nature of the specific operations. The FAA has decided to include an FRMS option in today's proposal. A certificate holder may utilize this option when it has developed an FAA-approved equivalent level of safety for monitoring and mitigating fatigue specific to those operations The proposed regulatory text provides broad performance requirements that a certificate holder would need to demonstrate it met prior to the FAA granting approval. These requirements include an additional FRMS-specific training element above and beyond the	within the timeframe mandated; it has not heard whether the submission is sufficient. In the event that the two are completely different, the redundancies should be obvious and avoided.

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general requirement proposed today. The extent of the additional training would be determined as part of the overall approval process.	
While FRMS is not fully matured, the general concepts are well understood and have been developed in other contexts. For example, the approach used to obtain ultra-long range OpSpecs is essentially an FRMS, except that it does not contemplate flightcrew members providing feedback to the certificate holder or a system of accountability. The FAA's Advanced Qualification Program, which has been in place since 1990, also incorporates many aspects of an FRMS. In addition, ICAO is currently working on developing FRMS standards. The FAA is actively engaged in the development of these standards, as are at least two members of the ARC. Accordingly, the FAA believes that FRMS will be sufficiently robust to be implemented for operations that cannot otherwise be accommodated under the rule by the time the rule takes effect. Generally, a certificate holder would need to demonstrate that its FRMS has an education and awareness training program; a fatigue reporting system; a system for monitoring flightcrew fatigue; a performance evaluation; and possibly an incident reporting process. The FAA issued advisory circular (AC) 120-103 entitled Fatigue Risk Management Systems for Aviation Safety on August 3, 2010 outlining the types of data and processes a certificate holder would need to develop to receive FRMS approval from the agency. As is the case with the proposed training requirements, whenever the Administrator finds that revisions are necessary for the continued adequacy of an FRMS, the certificate holder would have to make any changes in the program deemed necessary by the Administrator after being notified that such changes are needed. This would likely be done through the OpSpec process.	
The FAA requests comment on:	LAC strongly supports a well-defined FRMS as long as it could

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(34) Whether some elements of an FRMS, such as an incident reporting system, would be better addressed through a voluntary disclosure program than through a regulatory mandate?	be used to develop and support the company's unique operations, provided the requirements are clear so that proper credit is given to unique operations. Voluntary disclosure can work; however, the nature of reporting fatigue related potential violations seem to fall outside the normal provisions since they would more than likely be considered deliberate on the part of flightcrews. In other words, if a pilot reported that s/he had flown knowing they were tired, it would not be an inadvertent "violation."
M. Commuting The impact of commuting to a duty station has been linked to increased fatigue, most recently in the crash in Buffalo, New York. Commuting is common in the airline industry, in part because of lifestyle choices available to pilots by virtue of their being able to fly at no cost to their duty station, but also because of economic reasons associated with protecting seniority on particular aircraft, frequent changes in the flightcrew member's home base, and low pay and regular furloughs by some carriers that may require a pilot to live someplace with a relatively low cost of living. While commuting to a duty station can be handled responsibly (particularly assuming one has the means), it is also subject to abuse. The only current impediment to irresponsible commuting in the FAA's regulations is the general requirement in part 91 that pilots report to work fit for duty. CAP-371 provides that if journey time from home to normal home base is more than 1.5 hours, crew members should consider making arrangements for temporary accommodation nearer to base. This provision is not mandatory. The ARC unanimously recommended that pilots be reminded of their existing obligations under part 91 to report to work fit for duty, but that the FAA impose no new requirements. The FAA has tentatively rejected this	

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approach. Commuting is fundamentally a fitness for duty issue. If a flightcrew member commutes irresponsibly, it is possible that he or she may become fatigued. A responsible commuter plans his or her commute to minimize its impact on his or her ability to get meaningful rest shortly before flying, thus fulfilling the proposed requirement that he or she reports for an FDP rested and prepared to perform his or her assigned duty. The FAA considered proposing a requirement similar to the one in CAP-371 mandating that pilots arrive at the pilot's domicile airport in time to receive the pre-flight rest period in that area prior to commencing flight. At first blush, this approach has appeal, in that it would require a flightcrew member to have an opportunity for rest immediately prior to commencing an FDP. However, because commuting constitutes an activity conducted by a pilot on his or her own time, it is difficult to regulate. In addition, a strict commuting regulation, such as one that requires a pilot to report to a duty station area well in advance of the scheduled flight, would not necessarily result in more responsible commuting. A pilot could choose to commute during times that interfere with his or her WOCL (for example, taking a red eye for an afternoon flight), leaving him or her less rested for flight. This approach could also discourage responsible commuting. For example, today a flightcrew member can catch a mid-morning flight to his or her duty station and then commence his or her flying shortly after arrival a couple of hours later. The flightcrew member would have received a full night of sleep, and would be in a much better position to work than the individual who had taken an overnight or very early morning flight. While the irresponsible commuter would be available to fly by mid-afternoon, the mid-morning commuter would not be available to fly until late evening, just as he or she is beginning to tire.	

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The FAA does believe that it is unreasonable to assume that an individual is resting while commuting. Accordingly, time spent commuting, either locally or long-distance, is not considered rest, and a certificate holder will need to consider the commuting times required by individual flightcrew members to ensure they can reach their home base while still receiving the required opportunity for rest. This approach is consistent with that taken for transportation to and from a sleep facility other than home discussed earlier in this document. The FAA also believes it is inappropriate to simply rely on the existing requirements in part 91 to report to work fit for duty. The FAA believes a primary reason that pilots may engage in irresponsible commuting practices is a lack of education on what activities are fatiguing and how to mitigate developing fatigue. The FAA has developed a draft fitness for duty AC that elaborates on the pilot's responsibility to be physically fit for flight prior to accepting any flight assignment, which includes the pilot being properly rested. Additionally, the AC outlines the certificate holder's responsibility to ensure each flightcrew member is properly rested before assigning that flightcrew member to any flight. That document has been placed in the docket for this rulemaking. Additionally, the proposed training program discussed earlier contains an element on the impact of commuting on fatigue.	
N. Exception for Emergency and Government Sponsored Operations The ARC discussed various types of supplemental operations that may not be adequately addressed by the proposed requirements. These operations range from moving armed troops for the U.S. military and conducting humanitarian relief, repatriation, Civil Reserve Air Fleet (CRAF), Air Mobility Command (AMC), and State Department missions. Many of these types of supplemental	The agency must provide reasonable regulations regarding these types of operations. They comprise a significant portion of LAC activity; to state that those engaged in government contracts must adhere to the current part 121 regulations recognizes that the agency did make accommodations through Subpart S.

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operations fly into hostile areas, while others are conducted into politically sensitive, remote areas without rest facilities. The ARC recognized the uniqueness of these operations and noted that today some AMC and emergency operations are conducted under a deviation authority contained in 14 CFR 119.55 and 119. 57.	
Currently, all flights operated by an air carrier under contract with a U.S. Government agency must comply with part 121 or part 135, including flight and duty time regulations. These operations include, but are not limited to: • AMC contracts and other Department of Defense (DOD) contracts; • State Department contracts; • Department of Homeland Security contracts, including FEMA, humanitarian flights and Immigration and Customs Enforcement deportations; and • Department of Justice contract flights.	
Activation of the CRAF would allow military use of civil aircraft. CRAF is activated by presidential order in a time of war. Under CRAF, air carriers are required to operate their aircraft at the direction of DOD. However, the activation of CRAF does not obviate the air carrier's responsibility to operate under part 121, including the flight and duty time regulations.	
14 CFR 119.55 allows the FAA Administrator to authorize an air carrier who has a contract with AMC a deviation to any part of part 119, 121, or 135 for the operation under that contract. AMC reviews an air carrier's request for a deviation and either supports it or does not support it before AMC forwards the request to the FAA for a final decision.	Allowing a deviation under part 119 relies upon availability of the FAA on a case-by-case basis, something that cannot be guaranteed. The Subpart S recognition is more stable and more conducive to the regulator and the regulated.
14 CFR 119.57 allows the FAA Administrator to authorize deviations during an	

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emergency under certain conditions. The FAA has used this authority in the past. For instance, an OpSpec was used during Hurricane Katrina to allow humanitarian flights into and out of New Orleans. This authority is issued on a case by case basis during an emergency situation as determined by the Administrator. Neither of these current regulatory options fully address the needs of carriers who occasionally need to exceed the allowable FDP (with extensions) or who are operating under contract to a U.S. government agency other than AMC. These operations are distinguishable from tourism operations or operations where cargo shows up late to the aircraft for loading. The FAA recognizes that all carriers could encounter circumstances that would require a flightcrew member to exceed the limits in the FDP, including extensions. The most likely scenario probably would be a diversion into an area where, for whatever reason, it would not be safe for the crew or passengers to stay. In addition, the FAA recognizes that there is a public policy interest in permitting the United States government to contract out certain operations to air carriers. If these operations were conducted on military aircraft, the pilots would generally be subject to a 16-hour duty day, almost all of which could be flight time. Currently, if a military pilot flies a similar operation into a hostile area and must fly an aircraft out of theater due to a military exigency, and doing so would cause that pilot to exceed the military-mandated flight and duty time limits, that pilot can call his or her or her central command for permission to do so. A similar system, with FAA involvement, seems to make sense. In the event that there is no time to call back to the air carrier, the captain's emergency authority would allow the captain to move the airplane to safety, with a report to the FAA. Likewise, the pilot in command is always authorized	

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to address emergency situations.	
The concern of the FAA is not that circumstances may arise that require pilots to take emergency action, but rather that air carriers should know that delays in certain operations for the U.S. government are possible and plan accordingly. Air carriers should mitigate the chances of such an event, for instance by staging crews at other airports or installing rest facilities on the aircraft to allow augmentation, in order to ensure that flight crews will not exceed FDP limits. Fundamentally, a carrier needs to have performed adequate planning for the mission, including having the appropriate onboard rest facilities or number of flightcrew members for the length of the duty day, and the emergency should not be self-induced. If a certificate holder chooses not to equip an aircraft with adequate rest facilities, then the certificate holder should not be able to claim an inability to comply with requirements because of the lack of those facilities.	The ability to plan for uncertainty is available under the current Subpart S, which is a simple, straightforward methodology of dealing with the unique requirements of non-scheduled carriers. It is confusing to LAC that the agency wishes to develop a complicated, incomprehensible requirement to cover operations that have been allowed for years with very little impact on the safety of the flightcrew or the public.
The FAA proposes to allow air carriers operating commercial flights and who are not under contract with a U.S. government agency to ask for a “one time deviation” to the FDP limits under part 121 for a one-time event in exceptional circumstances. Each event of this type would be reported to the FAA. The number of “one time deviations” would be tracked by the FAA, as would the rationale for needing the deviation. If the Administrator determines that the carrier is relying excessively on this deviation authority, the air carrier would have to change its operations or develop an FRMS in order to mitigate the chances of such events happening in the future. There would be extra rest requirements after such an event.	LAC submits that the “one-time deviation” would be an ongoing occurrence for its unique operations. The development of the FRMS is a “work around” to continuation of Subpart S.
For operations under contract with a U.S. government agency that cannot be conducted consistent with the general rules because of unique circumstances (such as when operating into an SFAR area, or when there is a	The U.S. government is not the only entity that requires unique operations; the entire State of Alaska is a harsh, unusual environment. The air service LAC provides ensures the

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declared military exigency that necessitates operations outside the scope of what the regulation contemplates), a different approach is proposed. Such operations could be conducted under an exception to the FDP and flight time limits, but not to the cumulative restrictions on FDP, flight time and duty. In addition, additional rest would be required and the carrier would have to demonstrate why the operations could not have been adjusted to prevent exceeding the daily limits. This could be done with a bi-monthly reporting requirement. By tracking these events, the FAA can determine if the air carrier is properly planning its operations and mitigating the chances of its flight crews exceeding the FDP limits. The proposed regulation contemplates that the air carrier will develop an FRMS if it cannot restructure its operations so that only very few of those operations continue to need the exception. Sections 119.55 and 119.57 would remain unchanged and used as they are today.	viability of extremely remote locations. These services are provided continuously and each is unique. The current regulations recognize these vital differences and allow the continued existence of isolated communities. Additional reporting and other measures are unnecessary to ensure the mitigation of fatigue in flightcrews.
(35) Are there other types of operations that should be excepted from the general requirements of the proposal? If so, what are they, and why do they need to be accommodated absent an FRMS?	Absolutely, as has been stated repeatedly by the non-scheduled operators, Subpart S must be continued. The regulation allows for the unique operations of such carriers.
IV. Regulatory Notices and Analyses Regulatory Impact Analysis, Regulatory Flexibility Determination, and Unfunded Mandates Assessment Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96-354) requires agencies to analyze the economic	

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impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96-39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, the Trade Agreements Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this proposed rule. The FAA suggests readers seeking greater detail read the full regulatory impact analysis, a copy of which the agency has placed in the docket for this rulemaking. In conducting these analyses, the FAA has determined that this proposed rule: (1) Has benefits that justify its costs, (2) is an economically ``significant regulatory action'' as defined in section 3(f) of Executive Order 12866, (3) is “significant” as defined in DOT's Regulatory Policies and Procedures; (4) would have a significant economic impact on a substantial number of small entities; (5) would not create unnecessary obstacles to the foreign commerce of the United States; and (6) would impose an unfunded mandate on State, local, or tribal governments, or on the private sector by exceeding the threshold identified above. These analyses are summarized below. Benefits of the Rule During the past 20 years, there have been over 18 aviation accidents caused by pilot error where pilot fatigue was a factor. NTSB has identified five	

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accidents where the flight crew started the day in a state of fatigue. We statistically identified 4.6 accidents where the flight crew became fatigued during a long flight-duty period (NTSB cited pilot fatigue as a contributing factor in three of those accidents). We have also statistically estimated that some of the 6.2 accidents that occurred between midnight and 6 a.m. involved some degree of pilot fatigue. Two of these have already been accounted for in the previously discussed analyses. There were also three accidents where the pilot became fatigued due to being awake for many hours. Lastly, there were two accidents where chronic fatigue was a contributing factor. In summary, we project there would be at least 18.8 accidents (13 passenger airplane accidents and 5.8 cargo airplane accidents) during the next 20 years where pilot fatigue would be a contributing factor to the accident. Having projected the possible extent of fatigue based on the historical record, we estimate the likelihood of accidents happening in the future using simulation techniques. We also use simulation techniques to estimate future casualties, which we monetize. In this way, we estimate the potential benefits of the proposed rule. Finally, we model risk of fatigue for current pilot schedules, and compute the number of hours in higher risk categories with and without the rule. The projected reduction in fatigue exposure is corroborating evidence supporting this proposal. Pilot fatigue is a serious problem. If nothing is done about this problem, we can expect from one to possibly six aviation accidents a year where pilot fatigue will be a contributing factor. Pilot fatigue will be a contributing factor in many accidents that could potentially cost billions of dollars. Using simulation analysis, the mean is 28.9 airplane accidents in a ten-year period. These accidents would result in a mean of 174.7 deaths. The estimated cost of these accidents would be a mean value of $1.581 billion	

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($1.121 billion, present value). These numbers represent an estimate of the likely number of future accidents, deaths, and costs from future accidents with fatigue as a factor. The above analysis establishes an estimate of the number and range of fatigue related accidents if no action is taken to address the problem. It is seldom the case that a rule is 100 percent effective at addressing an identified problem. In particular, fatigue is rarely a primary or sole cause of an accident, and therefore this rule, if adopted, is not likely to prevent all future accidents that include fatigue as a factor. FAA reviewed all NTSB accident reports on part 121 accidents that occurred from 1990 through 2009 to assess the likely capacity of the NPRM to have averted those accidents. The FAA's Office of Accident Investigation & Prevention assessed the effectiveness of this rule to prevent accidents like those in the historical database. Most reports on major accidents (hull losses or non-hull losses that resulted in multiple fatalities) provided extensive data on flight crews' duty tours and recent rest periods, which facilitated relatively strong assessments. The FAA's Office of Accident Investigation and Prevention (AVP) rated each accident by conducting a scoring process similar to that conducted by the Commercial Aviation Safety Team (CAST), a well documented and well understood procedure. All the accidents that have had final National Transportation Safety Board (NTSB) reports published have been scored against the CAST safety enhancements. When these accidents were not well defined in the probable cause or contributing factors statements of the NTSB reports, AVP used a Joint Implementation Monitoring Data Analysis Team (JIMDAT)-like method.	

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Following this scoring, the proposed rule would be 40 percent effective at preventing passenger airplane accidents where pilot fatigue was a contributing factor and would be 58 percent effective at preventing cargo airplane accidents where pilot fatigue was a contributing factor. Accordingly, the above estimate of the benefits of avoiding passenger airplane accidents where pilot fatigue was a causal factor have been reduced from their above stated values. The revised estimated benefits of avoiding passenger and cargo airplane accidents would be a mean value of $659.4 million ($463.8 million, present value).	
Cost of the Rule The total estimated cost of the proposed rule is $1.25 billion ($804 million present value using a seven percent discount rate) for the ten year period from 2013 to 2022. The FAA classified costs into four main components and estimated the costs for each component. We obtained data from various industry sources; the sources of the data used in cost estimation are explained in each section. We were very fortunate that several carriers ran two alternatives to the proposed rule through their crew scheduling programs. Their estimates provided some comparison data to calibrate and validate our costing approach. Without their help, we would have likely missed some cost elements. The table below provides a summary of the four main cost components. Flight operations cost makes up about 60 percent of the total cost of the rule. Each of the main cost components are explained in-depth in the following sections of this document.	

Summary of Costs

Cost Component	Nominal Cost (millions)	PV Cost (millions)

<table>
<tr><th>NPRM</th><th>Comments</th></tr>
<tr><td>
<table>
<tr><td>Flight Operations</td><td>$ 760.3</td><td>$ 484.2</td></tr>
<tr><td>Schedule Reliability</td><td>$ 4.9</td><td>$ 3.0</td></tr>
<tr><td>Fatigue Training</td><td>$ 262.3</td><td>$ 167.2</td></tr>
<tr><td>Rest Facilities</td><td>$ 226.6</td><td>$ 149.1</td></tr>
<tr><td>Total</td><td>$ 1,254.1</td><td>$ 803.5</td></tr>
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</td><td></td></tr>
<tr><td>
In addition to the costs presented in this table, there may be costs of a fatigue risk management system (FRMS). The FAA is not imposing an FRMS program requirement on Part 121 carriers, but is allowing them the option of developing and implementing such a program. Operators might do this for ultralong flights, which have flight time over 16 hours. Operators might develop an FRMS program as an alternative to the flight and duty period rules proposed by this rulemaking when the crew scheduling cost savings equal or exceed the costs of the FRMS program. The FAA estimates that an FRMS program would cost between $0.8 and $10.0 million for each operator over ten years. The FAA believes that about 35 operators have at least partially adopted an FRMS program at this time. The FAA estimates the total cost would be $205.7 million ($144.9 million present value), which would be more than offset by a reduction in crew scheduling costs. Accordingly, the cost is not added to the total costs imposed by this rule. The FAA calls for comment on this aspect of the proposal as it has not assigned a cost to the cumulative maximums.

Summary of Benefits and Costs

Following NTSB recommendations regarding pilot fatigue, labor and industry worked together to provide the basis of this rulemaking. Furthermore, Congress has directed the FAA to issue a rule addressing pilot fatigue. We
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have validated the need for this rule in the benefit discussion. Based on the expected effectiveness of this proposed rule at preventing fatigue accidents with an averted fatality valued at $6 million, the simulation methodology produced benefits of $659.4 million with $463.8 million in present value. The total estimated costs of the proposed rule over 10 years are $1.25 billion ($804 million at present value). There is over a 7 percent probability that undiscounted cost of avertable passenger airplane accidents would exceed $1.25 billion and over a 10 percent probability the present value of the cost of avertable passenger airplane accidents would exceed $804 million. The benefits from a near term catastrophic accident in a 150-passenger airplane with average load factor exceeds the cost of this rule. If $8.4 million were used for VSL, the undiscounted benefits would be $837 million and the present value of those benefits would be $589 million. When the value of an averted fatality increases to $12.6 million, the present value of the benefits equals the present value of compliance costs. In addition, the FAA has identified two additional areas of unquantified benefits: preventing minor aircraft damage on the ground, and the value of well rested pilots as accident preventors and mitigators. Due to data limitations, the FAA was unable to estimate the cumulative effect of preventing minor aircraft damage on the ground, but if the rule were to reduce damage by about $600 million over 10 years ($340 million present value) it would break even in terms of net benefits using a $6 million VSL. These considerations lend weight towards moving ahead with this proposal. FAA invites comment on this issue. Alternatives Considered FAA examined a number of alternatives to the proposed rule, scheduling alternatives and a training alternative. Since crew scheduling costs comprised the largest share of costs, most of the alternative analysis focused on these costs and these will be discussed first. Alternatives were	

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selected using industry-proposed limits resulting from the ARC, as well as FAA-proposed limits. The table below summarizes each of the alternatives. For each of the scheduling alternatives, FAA developed a crew scheduling cost estimate using the same methodology as was used to determine the crew scheduling costs of the proposed rule.	

Summary of Crew Scheduling Alternatives

Scenario	Rest Time		Duty Time		Flight Time	
	Minimum Rest Prior to Duty – Domestic	Minimum Rest Prior to Duty – International	Maximum Flight Duty Time – Unaugmented	Maximum Flight Duty Time -- Augmented	Maximum Flight Time – Unaugmented	Maximum Flight Time – Augmented
Current Part 121	Daily: 8-11 depending on flight time	Minimum of 8 hours to twice the number of hours flown	16	16-20 depending on crew size	8	8-16 depending on crew size
Proposed Rule	9	9	9-13 depending on start time and number of flight segments	12-18 depending on start time, crew size, and aircraft rest facility	8-10 depending on FDP start time	None
Scenario A	10	12	9-13 depending on start time and number of flight segments	12-18 depending on start time, crew size, and aircraft rest facility	7-9 depending on FDP start time	16
Scenario B	9	11	9-13 depending on start time and number of flight segments	12-18 depending on start time, crew size, and aircraft rest facility	8-10 depending on FDP start time	None

Scenario A

FAA provided a sample of carriers with a draft version of the proposed rule in fall 2009. The carriers estimated the cost of this version of the proposed rule using their own crew scheduling models and processes. FAA also estimated the costs of the same version of the proposed rule for the entire industry

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using the crew scheduling model and process outlined in the crew scheduling costs sub-section of the flight operations cost section described in the full regulatory evaluation. Scenario A table below presents the annual crew scheduling resource costs for the Scenario A alternative. As we were able to accomplish our safety objectives at a lower cost, we rejected this alternative.	
Scenario A Crew Scheduling Resource Costs (table below)	
Scenario B FAA examined another, more restrictive version of the proposed rule. The main difference was that the minimum required rest for international duty periods was eleven hours. Scenario B table presents the final, adjusted crew	

Scenario A Crew Scheduling Resource Costs

Year	Nominal Cost (millions)	PV Cost (millions)
2013	$ 375.7	$ 306.7
2014	$ 354.3	$ 270.3
2015	$ 320.9	$ 228.8
2016	$ 314.0	$ 209.2
2017	$ 307.0	$ 191.2
2018	$ 300.1	$ 174.7
2019	$ 293.2	$ 159.5
2020	$ 286.3	$ 145.5
2021	$ 279.4	$ 132.7
2022	$ 272.5	$ 121.0
Total	$ 3,103.3	$ 1939.6

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scheduling resource costs of the Scenario B alternative.	

Scenario B Crew Scheduling Resource Costs

Year	Nominal Cost (millions)	PV Cost (millions)
2013	$ 254.7	$ 207.9
2014	$ 240.2	$ 183.2
2015	$ 217.5	$ 155.1
2016	$ 212.8	$ 141.8
2017	$ 208.2	$ 129.6
2018	$ 203.5	$ 118.4
2019	$ 198.8	$ 108.1
2020	$ 194.1	$ 98.7
2021	$ 189.4	$ 90.0
2022	$ 184.7	$ 82.0
Total	$ 2103.9	$ 1314.9

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Summary of Crew Scheduling Alternatives The summary table below provides the ten-year total crew scheduling resource costs for the proposed rule and each of the alternatives. The proposed rule represents the lowest-cost alternative and achieves the FAA safety objectives.	

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Alternative Scenarios Crew Scheduling Resource Costs Summary (see table below)	

Alternative Scenarios Crew Scheduling Resource Costs Summary

Scenario	Nominal Cost (millions)	PV Cost (millions)
Proposed Rule	$ 1,366.7	$ 854.2
Scenario A	$ 3,103.3	$ 1,939.6
Scenario B	$ 2,103.9	$ 1,314.9

Fatigue Training Cost Analysis of Alternatives to the Proposed Rule

Fatigue training costs account for approximately 20 percent of the total cost of the proposed rule. The FAA examined two scenarios for fatigue training requirements, ultimately selecting the lower-cost scenario for the proposed rule. The table below shows the different fatigue training requirements for each of the two scenarios.

Table 44: Summary of Fatigue Training Requirements Alternatives

Scenario	Initial Fatigue Training (hours)	Annual Recurring Fatigue Training (hours)
Proposed Rule	5	2
Scenario C	8	4

Scenario C

The fatigue training requirements of Scenario C differed significantly from the

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<tr><td>fatigue training requirements of the proposed rule. The required number of both initial and annual recurring fatigue training hours was substantially higher. Fatigue training was to take place in a classroom rather than through distance learning, which would result in higher costs due to the need to pay instructors, and the need to provide hotel and per diem compensation to flightcrew members receiving the fatigue training. As a result the costs are substantially higher. The FAA reviewed the recommended training requirements and decided to reduce the initial training requirements from 8 hours to 5 hours and reduce the recurrent training hours from 4 to 2 hours.</td><td></td></tr>
<tr><td>Alternative Scenario Fatigue Training Cost Summary
<table>
<tr><th>Scenario</th><th>Nominal Cost (millions)</th><th>PV Cost (millions)</th></tr>
<tr><td>Proposed Rule</td><td>$ 262.3</td><td>$ 167.2</td></tr>
<tr><td>Scenario C</td><td>$474.2</td><td>$ 333.7</td></tr>
</table></td><td></td></tr>
<tr><td>The FAA seeks comments on the alternatives analysis conducted to develop this proposal. In addition, it is requesting comments on possible approaches designed to reduce the costs of this rule while maintaining or increasing the benefits.</td><td>In lieu of Subpart S LAC could support portions of the alternative provided by NACA; it ensures the continued viability of air carriers that support unique and essential services while ensuring fatigue is managed. The methodology suggested can be sustained scientifically and economically.</td></tr>
<tr><td>Regulatory Flexibility Determination and Analysis

The Regulatory Flexibility Act of 1980 (RFA) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and</td><td></td></tr>
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governmental jurisdictions subject to regulation." To achieve that principle, the RFA requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.	
Agencies must perform a review to determine whether a proposed or final rule would have a significant economic impact on a substantial number of small entities. If the determination is that it would, the agency must prepare a regulatory flexibility analysis as described in the RFA.	
However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.	
The FAA believes that this proposed rule would have a significant economic impact on a substantial number of small entities and therefore has performed an initial regulatory flexibility analysis as required by the RFA. The Small Business Administration small entity criterion for small air carrier operators is 1,500 or fewer employees. The FAA invites comment from affected small entities and others to aid us to make an assessment of these impacts. In particular, the FAA invites more information on the financial stability and competitive positions of small entities.	LAC's initial estimate of the cost of this rule is provided in its cover letter to this Attachment. The viability of the company and the communities it serves are at risk. The vast majority of its operations are centered on unusual aircraft that cannot be replaced. LAC would be willing to provide commercially sensitive information to aid the FAA in making its assessment, but is frankly unsure of what data is needed.
Initial Regulatory Flexibility Analysis	
Under Section 603(b) of the RFA, the initial regulatory flexibility analysis	

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must address: • Description of reasons the agency is considering the action • Statement of the legal basis and objectives for the proposed rule • Description of the record keeping and other compliance requirements of the proposed rule • All federal rules that may duplicate, overlap, or conflict with the proposed rule • Description and an estimated number of small entities to which the proposed rule will apply • Analysis of small firms' ability to afford the proposed rule • Conduct a disproportionality analysis • Conduct a competitive analysis • Estimation of the potential for business closures • Description of alternatives considered Reasons the Rule Is Proposed The objective of the proposed rule is to increase the margin of safety for passengers traveling on U.S. part 121 air carrier flights. Specifically, the FAA wants to decrease diminished flight crew performance associated with fatigue or lack of alertness brought on by the duty requirements for flightcrew members. The Legal Basis and Objectives The legal basis for the proposed rule is found in 49 U.S.C. Section 44701 et seq. Specifically 49 U.S.C. Section 44701 (a)(4) requires the Administrator to promote safe flight of civil aircraft in air commerce by prescribing regulations in the interest of safety for the maximum hours or periods of service of	The legal basis must be supported by the agency's obligation under the Administrative Procedure Act to ensure it can regulate fairly and consistently without arbitrary and capricious results. The elimination of Subpart S will impact the non-scheduled airlines in an arbitrary and capricious manner since alternatives can be provided without degrading safety.

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airmen and other employees or air carriers. Among other matters the FAA must consider as a matter of policy the maintaining and enhancing of safety in air commerce as its highest priority (49 U.S.C. Section 40101(d)).	
The Projected Reporting, Recordkeeping, and Other Compliance Requirements of this NPRM	
This proposed rule would increase reporting and recordkeeping. In addition to changes in crew schedules, there would be a minor increase in documenting crew rest.	The amount of reporting would be, at the least, tripled for the types of operations conducted by LAC.
All Federal Rules That May Duplicate, Overlap, or Conflict With the Proposed Rule	LAC believes that the FRMS is duplicative of the plan required by Congress.
There are no Federal Rules that may duplicate, overlap, or conflict with the proposed rule.	
Description and an Estimated Number of Small Entities	
The proposed rule would apply to all certificate holders operating under part 121. There are 96 such operators of which 45 operators have fewer than 1,500 employees. Among these 45 operators, 25 are small entities that provide all air-cargo scheduled service competing with larger operators, code-share passenger service for large operators, and charter service.	
Affordability	
The FAA expects wide variability in cost impacts on small entity operators. The sample crew scheduling changes provide only a rough proxy for the impact on pilots' time and availability. Current crew schedules vary by	For LAC's unique operations, the mere hiring of pilots (and other flightcrew members) is problematic. As has been stated repeatedly, the type of aircraft and type of operations are highly unique. This is not a matter of "luring" pilots away or providing

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operator, labor contract, and size of pilot pools. The agency understands that many smaller operators have maximized their pilot time in the cockpit and may have little flexibility with potential new flight and duty regulations. Operators needing to hire more pilots would incur the cost of hiring, wages, overhead, and training. Some captains from smaller operators could be lured away by other operators, especially the larger operators with better benefit packages. That outcome might be mitigated by the recent extension of pilots being able to work to age 65 and the inherent flexibility of the larger carriers. The FAA requests that small entity operators provide estimated impacts of the proposed changes on their existing crew schedules. The FAA requests that all comments be accompanied by clear supporting data. For now the agency expects some small operators would likely need to hire more pilots. This increase in the demand for pilots may eventually raise pilot wages. Based on small operators who would need to hire more pilots and the resulting pressure on overall wages, there could be a significant economic impact. Disproportionality Analysis Part 121 operators would need to provide more rest for pilots which overall could result in the need to hire more pilots. The proposed changes to flight and duty time would be more difficult to accommodate for operators with small pilot staffs. While the changes to flight and duty may be measured in hours per week for operators with small, fully employed staffs, such changes can be difficult to accommodate. To be in compliance with the proposed changes small airlines may need a fraction of a new pilot's time to meet requirements. In this case, the airline would need to hire and train an additional pilot or reduce the number of operations. This added pilot would account for a larger percentage of the cost of pilots for the small airline than	better benefit packages; it is a matter of ensuring the individual can accomplish the operation.

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is likely to be the case for a major airline. The FAA believes that this may be the case for many small operators. Moreover, the smaller the operator, the more likely this situation will occur. Thus, the proposed rule is likely to have a disproportionate economic impact on small entities.	
Competitiveness Analysis The competitiveness analysis examines whether a small airline is under a competitive disadvantage from the implementation of the proposed rule. This proposed rule would impose significant costs on some small entities, and as a result it is likely to worsen such entities relative competitive position. A major criterion in a competitiveness analysis is the ability of an airline to pass on the costs imposed by the rule to their customers. The extent to which an airline can pass costs on to its customers is determined by the elasticity of demand of the service by the customer. The elasticity of demand for a product is a measure of the responsiveness to price that consumers have in their buying habits. The elasticity of demand is defined as the percentage change in quantity demanded resulting from a 1 percent change in price. If the demand for airline travel is relatively elastic, then the airlines would have less capacity to transfer the added cost of the rule to their passengers without losing significant revenue. For operators with a niche market, the demand for their services will be less elastic and more of the cost can be transferred. For instance, specialty cargo carriers have niche markets and some ability to pass on costs. Other operators would have little flexibility. In the most extreme case are operators who provide scheduled service for larger carriers generally under contract. Overall the disproportionate impact is likely to weaken small entity operators' competitive situation, but the FAA is unable to provide a measure of how much.	Since LAC performs operations that virtually no other aircraft can accomplish, the impact could result in the elimination of certain essential services. Elimination of these services would place remote locations, particularly in Alaska, at risk. The ability to pass on costs to “customers” is highly problematic; niche operators, particularly those in public-interest operations have very little elasticity on price points before other modes become more and more attractive except in emergency situations. Those “markets” that can only be served by air transportation are particularly vulnerable; they have very little extra monies to assure essential services.

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While the preceding discussion points out potential impacts of the proposed rule on the competitiveness of small entities, the FAA is uncertain about this impact on the level of competition within the U.S. airline industry. The FAA has very little firm-specific flight crew schedule data and route structure market data to refine this analysis and asks commenters to provide information on the impact this proposed rule would have on the continued capacity of small airlines to compete in their current markets. The FAA invites comment from affected airlines and other parties that might better inform the agency on this competitiveness issue.	
Business Closure Analysis Even if there is a disproportionate impact and a loss in competitive positioning does not mean a firm would have to close because of this proposed rule. While small entity operators are likely to experience a significant economic impact, changes to crew schedules are difficult to assess. Further complicating this business closure analysis are the external changes as upswings in traffic demand or declines in the price of fuel quickly improve the bottom-line. The FAA solicits comments from the aviation community regarding the likelihood of business closure. As noted previously, the FAA requests that all comments include supporting data. Alternatives Considered In accordance with the RFA, the FAA considered alternatives to the proposed rule to mitigate or eliminate significant economic impacts on small entities.	

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Alternative One--The FAA is promulgating this rule because the status quo alternative subjects the society to an unacceptably high aviation accident risk. Alternative Two--The FAA considered extending the compliance time, but again the purpose of this proposed rule is to reduce the accident risk and postponing the compliance period extends this risk. Alternative Three--The FAA did consider expanding the rule to include part 135 operators. All or nearly all of these operators are small entities. As the economic impact may be more severe, the agency wants to study the impact on these operators before proposing a rulemaking. The FAA has tentatively determined that there are no reasonable alternatives to this rulemaking that would lessen the potential impact on a substantial number of small entities. The agency seeks comment on this assessment. Unfunded Mandates Assessment Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (in 1995 dollars) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ``significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $143.1 million in lieu of $100 million. This proposed rule contains such a mandate; therefore, the requirements of Title II apply. The alternatives considered by the FAA are discussed above in the Summary of Benefits and Costs section.	LAC believes portions of the alternative presented by NACA must be considered in order to avoid the disparate application of this proposal on non-scheduled operations.

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Paperwork Reduction Act This proposal contains the following new information collection requirements. As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the FAA has submitted the information requirements associated with this proposal to the Office of Management and Budget for its review. Title: Flightcrew Member Duty and Rest Requirements. Summary: The FAA is proposing data collection from air carriers certificated under Title 14 Code of Federal Aviation Regulations (14 CFR) part 121 as prescribed in 14 CFR part 117, Flight and Duty Limitations and Rest Requirements: Flightcrew Members. Two sections in the proposal drive this requirement, 14 CFR part 117, Sec. 117.7 Schedule Reliability and Sec. 117.31 Operations in Unsafe Areas. In accordance with these two sections, each affected air carrier is required to submit a report to the FAA detailing: • Schedule reliability for each air carrier ongoing reportable of 2-month intervals, o For those air carriers conducting operations under contract for the United States Government and exceeding the proposed requirements, ongoing reportable periods of 2-month intervals, and o For those air carriers conducting operations not under contract for the United States Government and exceeding the proposed requirements, within 14 days of each occurrence, the air carrier relied on the relief granted under Sec. 117.31 to reposition the aircraft to a safe region. • Use of: Maintaining schedule reliability is a critical element to fatigue mitigation. Air carriers build flight schedules projected to meet the constraints of individual FDP. If, however, actual flight time exceeds the	

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projected (scheduled) flight time, the validity of the air carrier's scheduling process may come into question. This proposal places accountability upon each air carrier with regard to their scheduling practices and provides a means for the FAA to oversee the reliability of the air carrier's scheduling process relative to the flightcrew members actual FDP as opposed to the flightcrew member's scheduled FDP. The proposal defines a flight duty period as a period that begins when a flightcrew member is required to report for duty that includes a flight, a series of flights, or positioning flights, and ends when the aircraft is parked after the last flight and there is no intention for further aircraft movement by the same flightcrew member. If the air carrier's system-wide actual FDPs exceed the scheduled flight by more than five (5) percent or any actual FDP that exceeds the pairing-specific schedule by more than twenty (20) percent, the air carrier will be required to make adjustments to its schedule factoring in the actual time exceeded in order to reflect a more realistic schedule based upon actual data. Under the proposal, each air carrier must make scheduling reliability adjustments to its schedule any time the aforementioned limitations have been exceeded. Additionally, each air carrier must submit an ongoing report on 2-month intervals detailing its overall schedule reliability and pairing-specific reliability. This proposal provides relief for air carriers conducting operations into unsafe areas and repositioning the aircraft to another region for safety or a safe location where another crew can relieve the current crew from duty. As a result, these circumstances may result in a flightcrew member's FDP being exceeded for the day. The proposed section grants the air carrier authority to operate beyond the limits of the flightcrew's FDP to the extent of reaching a safe location where the crew must be relieved and/or go into required rest. However, by exercising such relief, the air carrier must report the occurrence	

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to the FAA. The reporting requirements are different for air carriers operating under a contract with the United States Government and those who are not. Air carriers under contract with the United States Government must submit a report every sixty (60) days detailing the number of times during the reporting period the air carrier relied on this relief, and for each occurrence, the reason for exceeding the FDP, the extent the FDP was exceeded and the reason the operation could not be completed consistent with part 117. If an air carrier does not rely on the proposed relief, there would be no obligation to report. If the air carrier is not under contract with the United States Government and relies on the proposed relief, it must submit a report within fourteen (14) days of each occurrence detailing the reason the FDP was exceeded, the extent the FDP was exceeded and the reason the operation could not be completed consistent with part 117. Respondents (including number of): The number of likely respondents is 92. The likely respondents to this proposed information requirement are part 121 certificate holders. Frequency: The FAA estimates each part 121 certificate holder will need to provide schedule reliability data every two months. Certificate holders regularly providing service to the United States government into unsafe areas may need to file reports as often as every two months. The FAA anticipates that certificate holders would only rarely need to fly into unsafe areas for reasons other than in support of U.S. government operations and estimates that fewer than five such reports would be filed each year. Annual Burden Estimate: This proposal would result in an annual recordkeeping and reporting burden	

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as follows: a. Number of respondents: 92. Scheduling and Schedule Reliability Reporting: 92. b. Total annual responses: 552. (92 carriers reporting 6 times each year: 92 x 6 = 552) Scheduling and schedule reliability reporting: 552. 1. Percentage of these responses collected electronically: 100%. Scheduling and Schedule Reliability Reporting: 100%. c. Total annual hours requested: 4,416 hours. (92 air carriers requiring 1 employee 8 hours to complete report: 92 x 1 x 8 = 4,416 hours). Scheduling and schedule reliability reporting: 4,416. d. Current OMB inventory: 0 hours. Scheduling and schedule reliability reporting: 0. e. Difference: 4,416 hours. Scheduling and Schedule Reliability Reporting: 4,416. Annual reporting and recordkeeping cost burden (in thousands of dollars) a. Total annualized capital/startup costs: $20,645. Scheduling and Schedule Reliability Reporting: $15. Fatigue Training. Fatigue Risk Management Systems: $20,630. b. Total annual cost ((O&M): $23,902. Scheduling and Schedule Reliability Reporting: $482. Fatigue Training: $23,420. Fatigue Risk Management Systems: $0. c. Total annualized costs requested: $44,547. Scheduling and Schedule Reliability Reporting: $497. Fatigue Training: $23,420. Fatigue Risk Management Systems: $20,630.	

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d. Current OMB inventory: $0. Scheduling and Schedule Reliability Reporting: $0. Fatigue Training: $0. Fatigue Risk Management Systems: $0. e. Difference: $44,547. Scheduling and Schedule Reliability Reporting: $497. Fatigue Training: $23,420. Fatigue Risk Management Systems: $20,630. The agency is soliciting comments to-- (1) Evaluate whether the proposed information requirement is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility; (2) Evaluate the accuracy of the agency's estimate of the burden; (3) Enhance the quality, utility, and clarity of the information to be collected; and (4) Minimize the burden of collecting information on those who are to respond, including by using appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology. Individuals and organizations may send comments on the information collection requirement by November 15, 2010, and should direct them to the address listed in the Addresses section at the end of this preamble. Comments also should be submitted to the Office of Management and Budget, Office of Information and Regulatory Affairs, Attention: Desk Officer for FAA, New Executive Building, Room 10202, 725 17th Street, NW., Washington, DC 20053. According to the 1995 amendments to the Paperwork Reduction Act (5 CFR	

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1320.8(b)(2)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid OMB control number. The OMB control number for this information collection will be published in the Federal Register, after the Office of Management and Budget approves it. Executive Order 13132, Federalism The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. The agency has determined that this action would not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have federalism implications. Environmental Analysis Environmental Analysis FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this proposed rulemaking action qualifies for the categorical exclusion identified in paragraph 312f and involves no extraordinary circumstances. Regulations That Significantly Affect Energy Supply, Distribution, or Use The FAA has analyzed this NPRM under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it is not a ``significant energy action'' under the executive order because while a "significant	

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regulatory action" under Executive Order 12866, it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Additional Information Comments Invited: The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. It also invites comments relating to the economic, environmental, energy or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments, please send only one copy of written comments, or if filing comments electronically, please submit your comments only one time. The FAA will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. Before acting on this proposal, the agency will consider all comments we receive on or before the closing date for comments. It will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. The FAA may change this proposal in light of the comments we receive. Proprietary or Confidential Business Information Do not file in the docket information that you consider to be proprietary or confidential business information. Send or deliver this information directly to the legal contact person identified in the FOR FURTHER INFORMATION	

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CONTACT section of this document. You must mark the information that you consider proprietary or confidential. If you send the information on a disk or CD ROM, mark the outside of the disk or CD ROM and also identify electronically within the disk or CD ROM the specific information that is proprietary or confidential. Under 14 CFR 11.35(b), when the FAA is aware of proprietary information filed with a comment, the agency does not place it in the docket. It is held in a separate file to which the public does not have access, and a note is placed in the docket that the agency has received it. If the agency receives a request to examine or copy this information, it treats it as any other request under the Freedom of Information Act (5 U.S.C. 552). The FAA processes such a request under the DOT procedures found in 49 CFR part 7. Availability of Rulemaking Documents An electronic copy of rulemaking documents may be obtained using the Internet by-- 1. Searching the Federal eRulemaking Portal (http://www.regulations.gov); 2. Visiting the FAA's Regulations and Policies web page at http://www.faa.gov/regulations_policies/; or 3. Accessing the Government Printing Office's Web page at http://www.gpoaccess.gov/fr/index.html. Alternatively, a copy may be requested directly from the FAA by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267-9680. Make sure to identify the docket number or notice number of this rulemaking. All documents the FAA considered in developing this proposed rule, including	

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economic analyses and technical reports, are located in the docket for this rulemaking and may be viewed on the internet through the Federal eRulemaking Portal referenced in paragraph (1).	
List of Subjects 14 CFR Part 117 Airmen, Aviation safety, Reporting and recordkeeping requirements, Safety. 14 CFR Part 121 Air carriers, Aircraft, Airmen, Aviation safety, Reporting and recordkeeping requirements, Safety. The Proposed Amendment In consideration of the foregoing, the Federal Aviation Administration proposes to amend Chapter I of Title 14, Code of Federal Regulations, as follows: 1. Part 117 is added to read as follows: PART 117--FLIGHT AND DUTY LIMITATIONS AND REST REQUIREMENTS: FLIGHTCREW MEMBERS Sec. 117.1 Applicability. 117.3 Definitions. 117.5 Fitness for duty.	

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117.7 Fatigue risk management system. 117.9 Schedule reliability. 117.11 Fatigue education and training program. 117.13 Flight time limitation. 117.15 Flight duty period: Un-Augmented operations. 117.17 Flight duty period: Split duty. 117.19 Flight duty period: Augmented flightcrew. 117.21 Reserve status. 117.23 Cumulative duty limitations. 117.25 Rest period. 117.27 Consecutive nighttime operations. 117.29 Deadhead transportation. 117.31 Operations into unsafe areas. Table A to Part 117--Maximum Flight Time Limits for Un-Augmented Operations Table B to Part 117--Flight Duty Period: Un-Augmented Operations Table C to Part 117--Flight Duty Period: Augmented Operations Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701-44702, 44705, 44709-44711, 44713, 44716-44717, 44722, 46901, 44903-44904, 44912, 46105.	
Sec. 117.1 Applicability. This part prescribes flight and duty limitations and rest requirements for all flightcrew members and certificate holders conducting operations under part 121 of this chapter. This part also applies to all flightcrew members and part 121 certificate holders when conducting flights under part 91 of this chapter.	

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Sec. 117.3 Definitions. In addition to the definitions in Sec. Sec. 1.1 and 119.3 of this chapter, the following definitions apply to this part. In the event there is a conflict in definitions, the definitions in this part control. Acclimated means a condition in which a crewmember has been in a theater for 72 hours or has been given at least 36 consecutive hours free from duty.	LAC recommends 30 hours as sufficient time to acclimatize to a new theatre of operations.
Airport/standby reserve means a defined duty period during which a crewmember is required by a certificate holder to be at, or in close proximity to, an airport for a possible assignment.	Please see the definition of short-call reserve.
Augmented flightcrew means a flightcrew that has more than the minimum number of flightcrew members required by the airplane type certificate to operate the aircraft to allow a flightcrew member to be replaced by another qualified flightcrew member for in-flight rest.	
Calendar day means a 24-hour period from 0000 through 2359.	In the FAA's Response to Clarifying Questions, **Calendar day** was clarified by the statement that "[a]s such, the FAA believes that the calendar day for the flight crew member's home base should be sufficient." Under our unique gateway basing methodology, many of our aircraft and therefore flight crew do not have an identifiable home base; therefore, further clarification of "calendar day" is necessary.
Certificate holder means a person who holds or is required to hold an air carrier certificate or operating certificate issued under part 119 of this chapter.	

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Crew pairing means a flight duty period or series of flight duty periods assigned to a flightcrew member which originate or terminate at the flightcrew member's home base.	In the Response to Clarifying Questions, **Crew Pairing** was clarified as "FAA intended to state that a crew pairing must begin or end at the crew members home base." This assumes a "hub and spoke" operation, and does not take into account non scheduled airline operations, particularly those with differing "home bases". These essential services must be dealt with by the FAA in its rulemaking.
Deadhead transportation means transportation of a crewmember as a passenger, by air or surface transportation, as required by a certificate holder, excluding transportation to or from a suitable accommodation.	
Duty means any task, other than long-call reserve, that a crewmember performs on behalf of the certificate holder, including but not limited to airport/standby reserve, short-call reserve, flight duty, pre- and post-flight duties, administrative work, training, deadhead transportation, aircraft positioning on the ground, aircraft loading, and aircraft servicing.	LAC recommends a change in the definition to Duty as meaning any task other than long-call reserve that a crewmember **is assigned by the certificate holder.**
Duty period means a period that begins when a certificate holder requires a crewmember to report for duty and ends when that crew member is free from all duties.	LAC would consider this definition too vague. For instance, would preparing expense reports, monthly time sheets etc. be considered duty and charged against a scheduled FDP?
Fatigue means a physiological state of reduced mental or physical performance capability resulting from lack of sleep or increased physical activity that can reduce a crewmember's alertness and ability to safely operate an aircraft or perform safety-related duties.	
Fatigue risk management system (FRMS) means a management system for an operator to use to mitigate the effects of fatigue in its particular operations. It is a data-driven process and a systematic method used to continuously monitor and manage safety risks associated with fatigue-related error.	

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Fit for duty means physiologically and mentally prepared and capable of performing assigned duties in flight with the highest degree of safety.	
Flight duty period (FDP) means a period that begins when a flightcrew member is required to report for duty with the intention of conducting a flight, a series of flights, or positioning or ferrying flights, and ends when the aircraft is parked after the last flight and there is no intention for further aircraft movement by the same flightcrew member. A flight duty period includes deadhead transportation before a flight segment without an intervening required rest period, training conducted in an aircraft, flight simulator or flight training device, and airport/standby reserve.	
Home base means the location designated by a certificate holder where a crew member normally begins and ends his or her duty periods.	This definition of home base is definitely not appropriate for LAC operations. The majority of our aircraft do not operate out of a single base, i.e. hub. This is one of the main differences between supplemental non-scheduled carriers and scheduled carriers.
Lineholder means a flightcrew member who has a flight schedule and is not acting as a reserve flightcrew member.	
Long-call reserve means a reserve period in which a crewmember receives a required rest period following notification by the certificate holder to report for duty.	

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Physiological night's rest means the rest that encompasses the hours of 0100 and 0700 at the crewmember's home base, unless the individual has acclimated to a different theater. If the crewmember has acclimated, the rest must encompass the hours of 0100 and 0700 at the acclimated location.	
Report time means the time that the certificate holder requires a crewmember to report for a duty period.	
Reserve availability period means a duty period during which a certificate holder requires a reserve crewmember on short call reserve to be available to receive an assignment for a flight duty period.	LAC strongly recommends that the definitions associated with the term “reserve” be changed to: Airport/standby reserve: The reserve status when the crewmember is required by the certificate holder to be available at the aircraft one hour from call out.
Reserve duty period means the time from the beginning of the reserve availability period to the end of an assigned flight duty period, and is applicable only to short call reserve.	
Reserve flightcrew member means a flightcrew member who a certificate holder requires to be available to receive an assignment for duty.	

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Rest facility means a bunk, seat, room, or other accommodation that provides a crewmember with a sleep opportunity. (1) Class 1 rest facility means a bunk or other surface that allows for a flat sleeping position and is located separate from both the flight deck and passenger cabin in an area that is temperature-controlled, allows the crewmember to control light, and provides isolation from noise and disturbance. (2) Class 2 rest facility means a seat in an aircraft cabin that allows for a flat or near flat sleeping position; is separated from passengers by a minimum of a curtain to provide darkness and some sound mitigation; and is reasonably free from disturbance by passengers or crewmembers. (3) Class 3 rest facility means a seat in an aircraft cabin or flight deck that reclines at least 40 degrees and provides leg and foot support.	
Rest period means a continuous period determined prospectively during which the crewmember is free from all restraint by the certificate holder, including freedom from present responsibility for work should the occasion arise.	
Scheduled means times assigned by a certificate holder when a crewmember is required to report for duty.	
Schedule reliability means the accuracy of the length of a scheduled flight duty period as compared to the actual flight duty period.	
Short-call reserve means a period of time in which a crewmember does not receive a required rest period following notification by the certificate holder to report for a flight duty period.	In the Response to Clarifying Questions, **Short call reserve** was clarified by this statement: “This form of reserve requires a Reserve Availability Period. While it is not technically a period of time, it is effectively time bound because it is neither airport/standby reserve nor long call reserve.” LAC is still unsure of what this would entail and requests more clarification.

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	Indeed, LAC recommends the following definition: Short-call reserve: The reserve status when a crewmember is required to be available at the aircraft two hours or longer from call out.
Split duty means a flight duty period that has a scheduled break in duty that is less than a required rest period.	
Suitable accommodation means a temperature-controlled facility with sound mitigation that provides a crewmember with the ability to sleep in a bed and to control light.	
Theater means a geographical area where local time at the crewmember's flight duty period departure point and arrival point differ by no more than 4 hours.	
Unforeseen operational circumstance means an unplanned event beyond the control of a certificate holder of insufficient duration to allow for adjustments to schedules, including unforecast weather, equipment malfunction, or air traffic delay.	This definition must encompass circumstances that non-scheduled operations commonly experience and that no amount of planning can reliably predict. While late arrival of cargo and inadequate ground handling equipment are “normal” occurrences; when lift is provided in remote locations that experience other unknown and unpredictable delays, it is virtually impossible to predict the combination of events that can take place.
Window of circadian low means a period of maximum sleepiness that occurs between 0200 and 0559 during a physiological night.	
Sec. 117.5 Fitness for duty. (a) Each flightcrew member must report for any flight duty period rested and prepared to perform his or her assigned duties.	LAC recommends deletion of section 117.5 (b) as it is addressed both in 117.5 (a) and (c) and contains ambiguous language “if the certificate holder **believes** the crewmember is too fatigued”. What evidence is necessary to uphold this belief? This places the responsibility to evaluate a crewmember condition squarely with the air carrier/certificate holder rather

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(b) No certificate holder may assign and no flightcrew member may accept assignment to a flight duty period if the flightcrew member has reported for a flight duty period too fatigued to safely perform his or her assigned duties or if the certificate holder believes that the flightcrew member is too fatigued to safely perform his or her assigned duties. (c) No certificate holder may permit a flightcrew member to continue a flight duty period if the flightcrew member has reported himself too fatigued to continue the assigned flight duty period. (d) Any person who suspects a flightcrew member of being too fatigued to perform his or her duties during flight must immediately report that information to the certificate holder. (e) Once notified of possible flightcrew member fatigue, the certificate holder must evaluate the flightcrew member for fitness for duty. The evaluation must be conducted by a person trained in accordance with Sec. 117.11 and must be completed before the flightcrew member begins or continues an FDP. (f) As part of the dispatch or flight release, as applicable, each flightcrew member must affirmatively state he or she is fit for duty prior to commencing flight. (g) Each certificate holder must develop and implement an internal evaluation and audit program approved by the Administrator that will monitor whether flightcrew members are reporting for FDPs fit for duty and correct any deficiencies.	than the claimed “dual responsibility”. Additionally, section 117.5 (b) is not an objective standard which makes it completely unworkable; LAC is not aware of any tests that conclusively determine an individual’s state of fatigue. Section 117.5(d) also needs to be deleted; it is ambiguous at best and opens the door for erroneous reports from persons with no knowledge of the operations or the symptoms of fatigue; it will also encourage reporting based upon questionable motives. LAC recommends deletion of section 117.5(e); the company supports NACA’s comments that state: Paragraphs (b), (d) and (e) cannot be implemented without extensive development of medical standards, fielding of medical equipment and assumption of significant legal liability. NACA does agree there must be a joint responsibility for safety and fatigue mitigation. The crewmember must have the responsibility that he/she must report fatigue when the situation would preclude safe flight. The training envisioned in the congressionally mandated fatigue risk management plan (FRMP) must be developed and implemented so as to build confidence in our understanding of fatigue and its mitigations before any prescriptive requirement in this section can be confidently met. We also acknowledge AC 120-100. As that training and confidence is accomplished, crewmembers will know how to better prepare for flight duty periods and know when to exercise their prerogative to report themselves to be too fatigued to enter or continue an FDP. Meanwhile, this section must be rewritten as shown above to withdraw sections (b), (d) and (e) as they are impossible to implement.
Sec. 117.7 Fatigue risk management system.	

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(a) No certificate holder may exceed any provision of this part unless approved by the FAA under a Fatigue Risk Management System that provides at least an equivalent level of protection against fatigue-related accidents or incidents as the other provisions of this part. (b) The Fatigue Risk Management System must include: (1) A fatigue risk management policy. (2) An education and awareness training program. (3) A fatigue reporting system. (4) A system for monitoring flightcrew fatigue. (5) An incident reporting process. (6) A performance evaluation. (c) Whenever the Administrator finds that revisions are necessary for the continued adequacy of an FRMS that has been granted final approval, the certificate holder must, after notification, make any changes in the program deemed necessary by the Administrator.	
Sec. 117.9 Schedule reliability. (a) Each certificate holder must adjust within 60 days -- (1) Its system-wide flight duty periods if the total actual flight duty periods exceed the scheduled flight duty periods more than 5 percent of the time, and (2) Any scheduled flight duty period that is shown to actually exceed the schedule 20 percent of the time. (b) Each certificate holder must submit a report detailing the scheduling reliability adjustments required in paragraph (a) of this section to the FAA	LAC does not concur with 117.9; the proposal assumes scheduled operations with established bases and route structure. Currently 66% of all LAC's operations are non-scheduled. There would be no schedule reliability number because there is no schedule. LAC recommends any reporting requirement should be limited to extensions to the FDP's as prescribed in Table A, B or C as appropriate. LAC requests the rewrite of section 117.9 as follows: Each certificate holder must record each extension to the

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every two months detailing both overall schedule reliability and pairing-specific reliability. Submissions must consist of: (1) The carrier's entire crew pairing schedule for the previous 2-month period, including the total anticipated length of each set of crew pairings and the regulatory limit on such pairings; (2) The actual length of each set of crew pairings, and (3) The percentage of discrepancy between the two data sets on both a cumulative, and a pairing-specific basis.	maximum FDP limitations shown at Table B and C and report them to the FAA quarterly. Reports must include the scheduled FDP hours at time of report for duty involving flight; the actual FDP hours; and a brief explanation for the extension. Non-scheduled operations consist of low-frequency, *ad hoc* or one-off flights. There are no established stations and routes. They operate under the provisions of 14 CFR part 121, Subpart S. Non-scheduled operations infrequently operate on the agreed-upon initial schedule because of the nature of the customer's requirements. Non-scheduled carriers offer services that are required to move when the customer is ready to move, not on a schedule of the carrier's making. Every scheduled or non-scheduled operation must be permitted to operate up to the maximum FDP established for time-of-day and number of segments as shown at Tables B or C. In general a quarterly report consisting of actual FDP extensions will best describe interruptions to "schedule reliability" for both scheduled and non-scheduled operations.
Sec. 117.11 Fatigue education and training program. (a) Each certificate holder must develop and implement an education and training program, approved by the Administrator, applicable to all employees of the certificate holder responsible for administering the provisions of this rule including flightcrew members, dispatchers, individuals involved in the scheduling of flightcrew members, individuals involved in operational control, and any employee providing management oversight of those areas. (b)(1) Initial training for all individuals listed in paragraph (a) of this section must consist of at least 5 programmed hours of instruction in the subjects listed in paragraph (b)(3) of this section. (2) Recurrent training for all individuals listed in paragraph (a) of this section	LAC does support fatigue education and training based upon programmed hours as proposed. The FAA provides no justification and seems to have picked these hours without any objective standard. The training should ensure that the knowledge has been absorbed.

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must be given on an annual basis and must consist of 2 programmed hours of instruction in the subjects listed in paragraph (b)(3) of this section. (3) The fatigue education and training program must include information on-- (i) FAA regulatory requirements for flight, duty and rest and NTSB recommendations on fatigue management. (ii) Basics of fatigue, including sleep fundamentals and circadian rhythms. (iii) Causes of fatigue, including possible medical conditions. (iv) Effect of fatigue on performance. (v) Fatigue countermeasures. (vi) Fatigue prevention and mitigation. (vii) Influence of lifestyle, including nutrition, exercise, and family life, on fatigue. (viii) Familiarity with sleep disorders and their possible treatments. (ix) Responsible commuting. (x) Flightcrew member responsibility for ensuring adequate rest and fitness for duty. (xi) Operating through and within multiple time zones. (c) Whenever the Administrator finds that revisions are necessary for the continued adequacy of a fatigue education and training program that has been granted final approval, the certificate holder must, after notification, make any changes in the program that are deemed necessary by the Administrator.	
Sec. 117.13 Flight time limitation. No certificate holder may schedule and no flightcrew member may accept an assignment or continue an assigned flight duty period if the total flight time:	Lynden Air Cargo strongly opposes any limitation of flight time within a prescribed Flight Duty Period and therefore recommends the deletion of section 117.13. There is no scientific basis for additional limitations. The company is in full concurrence with the NACA's comments on

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(a) Will exceed the limits specified in Table A of this part if the operation is conducted with the minimum required flightcrew. (b) Will exceed 16 hours if the operation is conducted with an augmented flightcrew.	this section. Additionally, 30 years of operational experience (13 on the part of LAC), has proven the validity of credit for a three person cockpit crew consisting of 2 pilots and 1 flight engineer. Many non-scheduled airlines, including LAC have successfully incorporated the additional crew member as an augmentation to safety.
Sec. 117.15 Flight duty period: Un-augmented operations. (a) Except as provided for in Sec. 117.17, no certificate holder may assign and no flightcrew member may accept an assignment for an unaugmented flight operation if the scheduled flight duty period will exceed the limits in Table B of this part. (b) If the flightcrew member is not acclimated: (1) The maximum flight duty period in Table B of this part is reduced by 30 minutes.(2) The applicable flight duty period is based on the local time at the flightcrew member's home base. (c) In the event unforeseen circumstances arise: (1) The pilot in command and certificate holder may extend a flight duty period up to 2 hours. (2) An extension in the flight duty period exceeding 30 minutes may occur only once in any 168 consecutive hour period, and never on consecutive days.	LAC fully concurs with NACA's comments and recommends section 117.15 be rewritten as follows: Sec. 117.15 Flight duty period: Un-augmented operations. (a) Except as provided for in section 117.15(b) and in section 117.17, no certificate holder may assign and no flightcrew member may accept an assignment for an un-augmented flight operation if the scheduled flight duty period will exceed the limits in Table B of this part. Insert new section 117.15(b) as follows: (b) In the case of an aircraft with a three-person cockpit with an un-augmented crew, a certificate holder may assign and a crewmember may accept a flight duty period that is extended up to 2 hours beyond the applicable flight duty period for an un-augmented flightcrew in Table B. In no case may the flight duty period exceed 16 hours. Change section 117.15(c) and (d) as follows: (c) ~~(b)~~ If the flightcrew member is not acclimated: (1) The maximum flight duty period in Table B of this part is reduced by one hour~~30 minutes~~. (2) The applicable flight duty period is based on the local time at the flightcrew member's home base *or acclimated location.* (d) ~~(c)~~ In the event unforeseen circumstances arise:

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	(1) The pilot in command and certificate holder may extend a flight duty period up to 2 hours, unless the pilot in command reports at the time of the decision that the crew is too fatigued to continue. (2) An extension in the flight duty period exceeding 30 minutes may occur no more than two times in any 168 consecutive hour period, and never on consecutive days. (3) Should flight duty periods be extended on two consecutive days, an intervening rest period of 16 hours must be provided prior to the next flight duty period.
Sec. 117.17 Flight duty period: Split duty. For a split duty period, a certificate holder may extend and a flightcrew member may accept a flight duty period up to 50 percent of time that the flightcrew member spent in a suitable accommodation up to a maximum flight duty period of 12 hours provided the flightcrew member is given a minimum opportunity to rest in a suitable accommodation of 4 hours, measured from the time the flightcrew member reaches the rest facility.	LAC fully concurs with NACA on rewriting section 117.17 as follows: For a split duty period, a certificate holder may extend an un-augmented flight duty period up to 90 minutes where the ground time permits a rest opportunity of at least 45 minutes with a subsequent 20-minute recovery period. Should the ground time permit a longer rest opportunity, the flight duty period may be extended by 75 per cent of the available rest opportunity for a rest facility equivalent to a Class 1 on-board rest facility; up to 50 per cent of the rest opportunity for a Class 2 rest facility; or up to 30 percent for a Class 3 rest facility, whichever is greater.

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Sec. 117.19 Flight duty period: Augmented flightcrew. The flight duty period limits in Sec. 117.15 may be extended by augmenting the flightcrew. (a) For flight operations conducted with an acclimated augmented flightcrew, no certificate holder may assign and no flightcrew member may accept an assignment if the scheduled flight duty period will exceed the limits specified in Table C of this part. (b) If the flightcrew member is not acclimated: (1) The maximum flight duty period in Table C of this part is reduced by 30 minutes. (2) The applicable flight duty period is based on the local time at the flightcrew member's home base. (c) No certificate holder may assign and no flightcrew member may accept an assignment under this section unless during the flight duty period: (1) Two consecutive hours are available for in-flight rest for the flightcrew member manipulating the controls during landing; (2) A ninety minute consecutive period is available for in-flight rest for each flightcrew member; and (3) The last flight segment provides an opportunity for in-flight rest in accordance with paragraph (c)(1) of this section. (d) No certificate holder may assign and no flightcrew member may accept an assignment involving more than three flight segments under this section unless the certificate holder has an approved fatigue risk management system under Sec. 117.7.	LAC recommends the rewriting of section 117.19 Flight duty period: Augmented flightcrew as follows. The flight duty period limits in Sec. 117.15 may be extended by augmenting the flightcrew. (a) For flight operations conducted with an acclimated augmented flightcrew, no certificate holder may assign and no flightcrew member may accept an assignment if the scheduled flight duty period will exceed the limits specified in Table C of this part. (b) If the flightcrew member is not acclimated: (1) The maximum flight duty period in Table C of this part is reduced by one hour 30 minutes. (2) The applicable flight duty period is based on the local time at the flightcrew member's acclimated location or home base. (c) At all times during flight, at least one flightcrew member with a PIC type-rating must be alert and on the flight deck. (d) In the event unforeseen circumstances arise: (1) The pilot in command and certificate holder may extend a flight duty period up to 3 hours. (2) An extension in the flight duty period exceeding 30 minutes may occur no more than twice and not on consecutive days, in any 168 consecutive hour period. (3) NEW! Should flight duty periods be extended twice in 168 hours, an intervening rest of 16 hours must be provided prior to the next flight duty period or short-call reserve.

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(e) At all times during flight, at least one flightcrew member with a PIC type-rating must be alert and on the flight deck. (f) In the event unforeseen circumstances arise: (1) The pilot in command and certificate holder may extend a flight duty period up to 3 hours. (2) An extension in the flight duty period exceeding 30 minutes may occur only once in any 168 consecutive hour period.	
Sec. 117.21 Reserve status. (a) Unless specifically designated otherwise by the certificate holder, all reserve is considered long-call reserve. (b) For airport/standby reserve, all time spent in a reserve status is part of the flightcrew member's flight duty period.	The proposed regulations on reserve status defy logic and appear to be more of a labor management agreement for scheduled air carriers than workable prescriptive regulations for non-scheduled operations. Non scheduled operations, by their very nature, do not operate routes with built in crew bases. LAC recommends a short call reserve structure of 16 hours of reserve duty and 8 hours off.
(c) For short call reserve, (1) All time within the reserve availability period is duty. (2) The reserve availability period may not exceed 14 hours. (3) No certificate holder may schedule and no reserve flightcrew member on short call reserve may accept an assignment of a flight duty period that begins before the flightcrew member's next reserve availability period unless the flightcrew member is given at least 14 hours rest. (4) The maximum reserve duty period for un-augmented operations is the lesser of-- (i) 16 hours, as measured from the beginning of the reserve availability period; (ii) The assigned flight duty period, as measured from the start of the flight duty period; or (iii) The flight duty period in Table B of this part plus 4 hours, as measured from the beginning of the reserve availability period.	Section 117.21(c)(3) requires more rest that prescribed for a long call reserve as referenced in 117.25(d). LAC agrees with NACA comments that the proposed scheme for shifting short-call reserve is illogical and unnecessary. In its Response to Clarifying Questions, the FAA states “the section on reserve was proposed largely as drafted by the ARC…the FAA believes the ARC members are in the best position to clarify what they intended when drafting the provision”. There were no clarify statements from the ARC. LAC proposes the following language for section 117.21(c) (c) For short call reserve, (1) All time within the reserve availability period is duty. (2) The reserve availability period may not exceed 16 hours. (3) No certificate holder may schedule and no reserve

NPRM	Comments
(iv) If all or a portion of a reserve flightcrew member's reserve of this section by one-half of the length of the time during the availability period falls between 0000 and 0600, the certificate holder may increase the maximum reserve duty period in paragraph (c)(4)(iii) reserve availability period in which the certificate holder did not contact the flightcrew member,not to exceed 3 hours. (5) The maximum reserve duty period for augmented operations is the lesser of-- (i) The assigned flight duty period, as measured from the start of the flight duty period; or (ii) The flight duty period in Table C of this part plus 4 hours, as measured from the beginning of the reserve availability period. (iii) If all or a portion of a reserve flightcrew member's reserve availability period falls between 0000 and 0600, the certificate holder may increase the maximum reserve duty period in paragraph (c)(5)(ii) of this section by one-half of the length of the time during the reserve availability period in which the certificate holder did not contact the flightcrew member,not to exceed 3 hours. (d) For long call reserve, (1) The period of time that the flightcrew member is in a reserve status does not count as duty. (2) If a certificate holder contacts a flightcrew member to assign him or her to a flight duty period or a short call reserve, the flightcrew member must receive the required rest period specified in Sec. 117.25 prior to reporting for the flight duty period or commencing the short call reserve duty. (3) If a certificate holder contacts a flightcrew member to assign him or her to a flight duty period that will begin before and operate into the flightcrew member's window of circadian low, the flightcrew member must receive a 12 hour notice of report time from the air carrier.	flightcrew member on short call reserve may accept an assignment of a flight duty period that begins before the flightcrew member's next reserve availability period unless the flightcrew member is given at least 8 hours rest. (4) The maximum reserve duty period for un-augmented operations is the lesser of-- (i) 16 hours, as measured from the beginning of the reserve availability period; (ii) The assigned flight duty period, as measured from the start of the flight duty period; or (iii) The flight duty period in Table B of this part plus 6 hours, as measured from the beginning of the reserve availability period. (iv) If all or a portion of a reserve flightcrew member's reserve of this section by the full length of the time during the availability period falls between 0000 and 0600, the certificate holder may increase the maximum reserve duty period in paragraph (c)(4)(iii) reserve availability period in which the certificate holder did not contact the flightcrew member. (5) The maximum reserve duty period for augmented operations is the lesser of-- (i) The assigned flight duty period, as measured from the start of the flight duty period; or (ii) The flight duty period in Table C of this part plus 6 hours, as measured from the beginning of the reserve availability period. (iii) If all or a portion of a reserve flightcrew member's reserve availability period falls between 0000 and 0600, the certificate holder may increase the maximum reserve duty period in paragraph (c)(5)(ii) of this section by the full length of the time during the reserve availability period in which the certificate holder did not contact the flightcrew member. Deleted section 117.21 from paragraph (d)(3) to the end.

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(e) An air carrier may shift a reserve flightcrew member's reserve availability period under the following conditions: (1) A shift to a later reserve availability period may not exceed 12 hours. (2) A shift to an earlier reserve availability period may not exceed 5 hours, unless the shift is into the flightcrew member's window of circadian low, in which case the shift may not exceed 3 hours. (3) A shift to an earlier reserve period may not occur on any consecutive calendar days. (4) The total shifts in a reserve availability period in paragraphs (e)(1) through (e)(3) of this section may not exceed a total of 12 hours in any 168 consecutive hours.	
Sec. 117.23 Cumulative duty limitations. (a) The limitations of this section on flightcrew members apply to all commercial flying by the flightcrew member during the applicable periods. (b) No certificate holder may schedule and no flightcrew member may accept an assignment if the flightcrew member's total flight time will exceed the following: (1) 100 hours in any 28 consecutive calendar day period and (2) 1,000 hours in any 365 consecutive calendar day period. (c) No certificate holder may schedule and no flightcrew member may accept an assignment if the flightcrew member's total Flight Duty Period will exceed: (1) 60 flight duty period hours in any 168 consecutive hours and (2) 190 flight duty period hours in any 672 consecutive hours.	LAC supports NACAs recommended rewrite of section 117.23(a)-(c) LAC believes that limiting crew member's cumulative duty to only 65 duty hours (effectively 4 days of availability a week) is too restrictive for non scheduled carriers.

NPRM	Comments
(d) Except as provided for in paragraph (d)(3) of this section, no certificate holder may schedule and no flightcrew member may accept an assignment if the flightcrew member's total duty period will exceed: (1) 65 duty hours in any 168 consecutive hours and (2) 200 duty hours in any 672 consecutive hours. (3) If a flightcrew member is assigned to short-call reserve or a certificate holder transports a flightcrew member in deadhead transportation in, at a minimum, a seat in aircraft cabin that allows for a flat or near flat sleeping position, the total duty period may not exceed: (i) 75 duty hours in any 168 consecutive hours and (ii) 215 duty hours in any 672 consecutive hours. (4) Extension of the duty period under paragraph (d)(3) of this section is limited to the amount of time spent on short-call reserve or in deadhead transportation.	
Sec. 117.25 Rest period. (a) No certificate holder may assign and no flightcrew member may accept assignment to any reserve or duty with the certificate holder during any required rest period. (b) Before beginning any reserve or flight duty period, a flightcrew member must be given at least 30 consecutive hours free from all duty in any 168 consecutive hour period, except that: (1) If a flightcrew member crosses more than four time zones during a series of flight duty periods that exceed 168 consecutive hours, the flightcrew member must be given a minimum of three physiological nights rest upon return to home base. (2) A flightcrew member operating in a new theater must receive 36 hours of consecutive rest in any 168 consecutive hour period.	Section 117.25(b)(1) should read: If a flightcrew member crosses more than four **consecutive** time zones during a series… LAC feels 30 hours of rest every 168 is sufficient rest in 117.25(a)(1)-(2). In its Response for Clarifying Questions, the FAA states that it

NPRM	Comments
(c) No certificate holder may reduce a rest period more than once in any 168 consecutive hour period. (d) No certificate holder may schedule and no flightcrew member may accept an assignment for reserve or a flight duty period unless the flightcrew member is given a rest period of at least 9 consecutive hours before beginning the reserve or flight duty period measured from the time the flightcrew member reaches the hotel or other suitable accommodation. (e) In the event of unforeseen circumstances, the pilot in command and certificate holder may reduce the 9 consecutive hour rest period in paragraph (d) of this section to 8 consecutive hours.	"does not anticipate that the flight crew member would notify the certificate holder that he or she arrived at the hotel with the full 9 hour rest opportunity…" and "…by linking the rest opportunity to check in and checkout, the certificate holder can rely on hotel records if the FAA investigates whether a crew member was afforded an adequate rest." LAC recommends that this section be worded to reflect that rest begins 90 minutes after block in of a flight. Relying on hotel records for check in and checkout is unreliable or unworkable. Crew rooms are arranged in advance and the actual check in process does not occur at the hotel; rather it may occur in the hotel van or on the road. Indeed, most hotels afford the opportunity for checking out the night prior, or if no incidental expenses are occurred, check out is automatic and the receipt is slipped under the hotel room door. There is no time record of when a crewmember actually leaves the rest facility. These examples are indicative of why reliance on hotel records is unrealistic. Additionally, when there is no hotel or other official method of establishing when the crew member "reaches…suitable accommodation, the proposed section becomes even more problematic. Having the crewmember call the certificate holder at check in and check out, which would require the certificate holder record those communications, is unnecessarily burdensome on the crewmember and the certificate holder. An average time (90 minutes) is more realistic.
Sec. 117.27 Consecutive nighttime operations. No certificate holder may schedule and no flightcrew member may accept more than three consecutive nighttime flight duty periods unless the certificate holder provides an opportunity to rest during the flight duty period	LAC recommends deletion of section 117.27; the proposal already addresses cumulative fatigue during night operations by limiting the FDP's in Table B. This is an example of the duplicative nature of this proposal.

NPRM	Comments
in accordance with Sec. 117.17.	
Sec. 117.29 Deadhead transportation. (a) All time spent in deadhead transportation is considered part of a duty period. (b) Time spent in deadhead transportation is considered part of a flight duty period if it occurs before a flight segment without an intervening required rest period. (c) Time spent entirely in deadhead transportation during a duty period may not exceed the flight duty period in Table B of this part for the applicable time of start plus 2 hours unless the flightcrew member is given a rest period equal to the length of the deadhead transportation but not less than the required rest in Sec. 117.25 upon completion of such transportation.	Section 117.29(c) is confusing and should be deleted; deadhead transportation in 117.29(a) is considered duty and section 117.25 provides for required rest prior to short call reserve or flight duty. In its Response to Clarifying Questions regarding 117.29 the FAA further confuses the issue by stating that "unlike flight crewmembers, a deadheading crewmember is not expected to work, so arguably he or she does not need a rest opportunity equivalent to, or potentially even greater than a flight crewmember flying the same route."
Sec. 117.31 Operations into unsafe areas. (a) This section applies to operations that cannot otherwise be conducted under this part because of unique circumstances that could prevent flightcrew members from being relieved by another crew or safely provided with the rest required under Sec. 117.25 at the end of the applicable flight duty period. (b) A certificate holder may exceed the maximum applicable flight duty periods to the extent necessary to allow the flightcrew to fly to a destination where they can safely be relieved from duty by another flightcrew or can receive the requisite amount of rest prior to commencing their next flight	The term "unsafe" must be removed, it is misleading. "Safe areas" and "unsafe areas" are not defined in section 117.3. These words are arbitrary as the FAA admits in its Response to Clarifying Questions where the agency states: **"the FAA does not believe it is possible to define what constitutes an 'unsafe area' with any specificity."**

NPRM	Comments
duty period. (c) The flightcrew shall be given a rest period immediately after reaching the destination described in paragraph (b) of this section equal to the length of the actual flight duty period or 24 hours, whichever is less. (d) No extension of the cumulative fatigue limitations in Sec. 117.3 is permitted. (e) If the operation was conducted under contract with an agency or department of the United States Government, each affected air carrier must submit a report every 60 days detailing the— (1) Number of times in the reporting period it relied on this section to conduct its operations. (2) For each occurrence, (i) The reasons for exceeding the applicable flight duty period; (ii) The extent to which the applicable flight duty period was exceeded; and (iii) The reason the operation could not be completed consistent with the requirements of this part. (f) If the operation was not conducted under contract with an agency or Department of the United States Government, each affected air carrier must submit a report within 14 days of each occurrence detailing-- (1) The reasons for exceeding the applicable flight duty period; (2) The extent to which the applicable flight duty period was exceeded; and (3) The reason the operation could not be completed consistent with the requirements of this part. (g) Should the Administrator determine that a certificate holder is relying on the provisions on this section, the Administrator may require the certificate	

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holder to develop and implement a fatigue risk management system.	

Table A to Part 117 – Maximum Flight Time Limits for Unaugmented Operations

Time of start (Home base)	Maximum flight time (hours)
0000-0459	8
0500-0659	9
0700-1259	10
1300-1959	9
2000-2359	8

Table B to Part 117 –Flight Duty Period: Unaugmented Operations

Time of start (Home base or acclimated)	Maximum flight duty period (hours) for lineholders based on number of flight segments						
	1	2	3	4	5	6	7+
0000-0359	9	9	9	9	9	9	9
0400-0459	10	10	9	9	9	9	9
0500-0559	11	11	11	11	10	9.5	9
0600-0659	12	12	12	12	11.5	11	10.5
0700-1259	13	13	13	13	12.5	12	11
1300-1659	12	12	12	12	11.5	11	10.5
1700-2159	11	11	10	10	9.5	9	9
2200-2259	10.5	10.5	9.5	9.5	9	9	9
2300-2359	9.5	9.5	9	9	9	9	9

<table>
<tr><th>NPRM</th><th>Comments</th></tr>
<tr><td>
TABLE C TO PART 117 – FLIGHT DUTY PERIOD: AUGMENTED OPERATIONS
<table>
<tr><th rowspan="3">Time of start
(local time)</th><th colspan="6">Maximum flight duty period (hours) based on rest facility and number of pilots</th></tr>
<tr><th colspan="2">Class 1 rest facility</th><th colspan="2">Class 2 rest facility</th><th colspan="2">Class 3 rest facility</th></tr>
<tr><th>3 pilots</th><th>4 pilots</th><th>3 pilots</th><th>4pilots</th><th>3 pilots</th><th>4 pilots</th></tr>
<tr><td>0000-0559</td><td>14</td><td>16</td><td>13</td><td>14.5</td><td>12</td><td>12.5</td></tr>
<tr><td>0600-0659</td><td>15</td><td>17.5</td><td>14</td><td>15.5</td><td>13</td><td>13.5</td></tr>
<tr><td>0700-1259</td><td>16</td><td>18</td><td>15.5</td><td>17</td><td>14</td><td>14.5</td></tr>
<tr><td>1300-1659</td><td>15</td><td>17.5</td><td>14</td><td>15.5</td><td>13</td><td>13.5</td></tr>
<tr><td>1700-2359</td><td>14</td><td>16</td><td>13</td><td>14.5</td><td>12</td><td>12.5</td></tr>
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<tr><td>
PART 121--OPERATING REQUIREMENTS: DOMESTIC, FLAG, AND SUPPLEMENTAL OPERATIONS

2. The authority citation for part 121 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701-44702, 44705, 44709-44711, 44713, 44716-44717, 44722, 46901, 44903-44904, 44912, 46105.

Subpart Q [Removed and Reserved]

3. Remove and reserve subpart Q, consisting of Sec. Sec. 121.470 and 121.471.

Subpart R [Removed and Reserved]

4. Remove and reserve subpart R, consisting of Sec. Sec. 121.480 through 121.493.

Subpart S [Removed and Reserved]

5. Remove and reserve subpart S, consisting of Sec. Sec. 121.500 through
</td><td>
LAC strongly opposes the removal of Subpart S. While it might be convenient, the assertion that airline operations are comparable enough to operate under a single Flight and Duty Time regulation flies in the face of the facts. We request that
</td></tr>
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NPRM	Comments
121.525. Issued in Washington, DC on September 3, 2010. Raymond Towles, Acting Director, Flight Standards Service, Aviation Safety. [FR Doc. 2010-22626 Filed 9-10-10; 4:15 pm]	Subpart S remain in the regulation and it apply to supplemental all cargo carriers.

TAB 15

BEFORE THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C.

In the matter of	)	
	)	
Notice of Proposed Rulemaking	)	Docket No. FAA-2009-1093
for Flightcrew Member Duty and Rest	)	
Requirements	)	
	)	

COMMENTS OF NATIONAL AIR CARRIER ASSOCIATION

Comments with respect to this document should be sent to:

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November 15, 2010

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BEFORE THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C.

In the matter of	)	
	)	
Notice of Proposed Rulemaking for Flightcrew Member Duty and Rest Requirements	)	Docket No. FAA-2009-1093

COMMENTS OF NATIONAL AIR CARRIER ASSOCIATION

Five things are clear from the Notice of Proposed Rulemaking[1] and the Regulatory Impact Analysis[2] setting forth the Federal Aviation Administration's Proposed Rule on flightcrew member duty and rest requirements ("Proposed Rule"): (1) the Federal Aviation Administration ("FAA") has utterly failed to consider the unique nature of the operations of non-scheduled carriers; (2) the FAA has utterly failed to consider that NACA's thirteen non-scheduled member carriers are small businesses and that the Proposed Rule will have a disproportionately large and disastrous effect on those carriers, requiring an astounding **increase of 42% in flightcrews** and an unsustainable **$3.698 billion in new costs** plus lost revenue over the first ten years to implement this one rule; (3) the costs of the Proposed Rule so far outweigh its benefits as to non-scheduled carriers that it cannot be adopted as currently drafted, particularly since the FAA's total projected cost increases for the entire industry from the Proposed Rule are less than the projected cost increases for NACA's non-scheduled member carriers ***alone***;

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[1] Notice of Proposed Rulemaking – Flightcrew Member Duty and Rest Requirements, 75 Fed. Reg. 55852 (Sept. 14, 2010) ("NPRM").

[2] Regulatory Impact Analysis – Flightcrew Member Duty and Rest Requirements, Docket FAA-2009-1093 (Sept. 3, 2010) ("RIA").

(4) the FAA's assertion that carriers will be able to pass on increased costs to their customers does not apply to most of NACA's non-scheduled carriers, which rely on U.S. military business and are already facing a proposed reduction in the blended rate for cargo and passenger operations of up to 10% for the 2011 Fiscal Year; and (5) the RIA wholly fails to support the cost-benefit analysis required by law.

NACA asks that the FAA leave the current Subpart S in effect while the FAA conducts a separate rulemaking on appropriate flightcrew member rest and duty requirements for non-scheduled operations. NACA further requests that, should the FAA determine that changes to Subpart S are necessary, that it adopt NACA's Proposal, set forth in **Appendix A**, as an amendment to Subpart S of Part 121 continuing the separate and distinct flight and duty time regulation for non-scheduled carriers. As explained in **Appendix A**, NACA's Proposal would offer an equivalent or higher level of safety to the Proposed Rule.[3]

I. NACA's Carriers and Their Operations

NACA, founded in 1962, is comprised of sixteen air carriers certificated under 14 C.F.R. Part 121, thirteen of which provide non-scheduled passenger and cargo services.[4]

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[3] While in some cases NACA's proposed flight duty period limits exceed the Proposed Rule, NACA's Proposal provides more fatigue mitigation than the Proposed Rule at nearly every turn, including longer rest periods for unacclimated flightcrew members, fewer hours for flight duty period extensions, and ample in-flight rest in augmented operations, thereby ensuring the continued safety of non-scheduled operations. See Appx. A.

[4] NACA's members include Air Transport International, Allegiant Air, Atlas Air Cargo, Evergreen Airlines, Kalitta Air, Lynden Air Cargo, Miami Air International, National Airlines, North American Airlines, Northern Air Cargo, Omni Air International, Ryan International Airlines, Southern Air, Sun County Airlines, USA 3000 Airlines, and World Airways.

NACA’s non-scheduled member carriers fill a unique niche in the air carrier industry. These carriers offer services in response to ever-changing demands by the traveling public and business, including on-demand service in support of United States military and humanitarian efforts worldwide. NACA’s members are focused on serving the U.S. Department of Defense (“DOD”) through the Civil Reserve Air Fleet (“CRAF”) program by providing airlift capacity for troop and cargo movements to war zones and other remote and hostile locations around the world, including Iraq and Afghanistan. NACA’s non-scheduled member carriers provide the bulk of lift for DOD during peacetime (as the current period is defined by DOD) as well as a significant contribution during actual CRAF activations. These same carriers also provide critical support for humanitarian relief operations through flights to limited-access locations, such as Haiti, before and after natural disasters.

NACA’s non-scheduled member carriers play a critical role in the transportation of military personnel and cargo. As USTRANSCOM Commander General Duncan McNabb testified before the U.S. House of Representatives, CRAF air carriers provide approximately 40.6 million ton-miles per day in bulk cargo capacity and approximately 200 million passenger-miles per day for U.S. military operations. USTRANSCOM typically relies upon CRAF carriers to move 40 percent of all military cargo and over 90 percent of all military passengers. See Testimony of General Duncan J. McNabb, U.S. Air Force, before the Transportation & Infrastructure Committee – Aviation Subcommittee, U.S. House of Representatives (May 30, 2009). The vast majority of these CRAF missions are performed by non-scheduled carriers.

In addition, all of NACA's non-scheduled member carriers are small companies with fewer than 1,500 employees each, and most have fewer than 750 employees each. Even taken together, the revenues, number of employees, and fleet size of NACA's non-scheduled member carriers are approximately 1/40th the size of the large U.S. legacy passenger and cargo carriers upon which the NPRM is apparently based. See Section II., infra. Thus, NACA's non-scheduled member carriers have little or no flexibility to absorb the increased financial and operational burdens from new regulatory requirements. See 75 Fed. Reg. at 55582 (noting that some small operators will have little flexibility or ability to pass on increased costs to customers).

II. NACA's Non-Scheduled Member Carriers Are Significantly Different From Scheduled Carriers.

The operations of NACA's non-scheduled member carriers are vastly different from scheduled carriers. Unlike scheduled carriers, NACA's non-scheduled member carriers provide on-demand operations on behalf of private and government consumers, on the customer's timetable, usually at a price negotiated for use of the entire aircraft. Those carriers serve remote, sometimes hostile locations, with no established crew bases because the same locations are rarely served on a regular basis. NACA's non-scheduled members provide service that differs from scheduled carriers in the following ways:

- Schedule – Unlike scheduled carriers, which select city-pairs and bid crews to serve well in advance of each flight, non-scheduled carriers do not have regular flight schedules known months in advance. Non-scheduled carriers often are called to fly with little advance notice, making it impossible to know departure and destination locations, departure and arrival routes, or flying hours until shortly before flights. Unlike scheduled carriers that are able to build in rest periods for their crews in their flight schedules worked out and agreed to months in advance, non-scheduled carriers cannot do so because they cannot predict their future flight schedules.

- No Base of Operations – Scheduled carriers typically build stations at hub airports, enter into long-term leases for gates and servicing, and provide permanent manning of station management, ground handling, and flightcrew domiciles. Non-scheduled carriers have none of those options; they must place all equipment and personnel for any services needed on a flight on the aircraft, such as parts, tools, flight mechanics, and loadmasters.
- Operating Environment – Nonscheduled carriers provide ad hoc 24-hour operations that include crossing multiple time zones and significant back-of-clock flying, often to destinations with no other U.S. air carrier operations. Scheduled carriers offer primarily gateway-to-gateway flights across established stations, at ideal hours of their own choosing, with their global alliance partners available to provide services at connecting and beyond-gateway cities. Non-scheduled carriers do not control their destinations, hours of departure, or the ground facilities available at their departure or destination locations.
- Third-Party Control of Trip Flow – Non-scheduled carriers are at the mercy of their customers and ground service providers to stay on schedule. A customer's failure to provide passengers or cargo at the agreed-upon location at the contracted time, or the failure of ground service providers to meet fuel or catering needs on time, often cause ground delays for non-scheduled flights. As a result, NACA's non-scheduled member carriers experience ground turn-around times that average two hours in domestic

operations, as compared to less than one hour for most scheduled carriers' domestic operations. These critical flow considerations that are requirements for scheduled service are not present for non-scheduled carriers. Scheduled carriers control their own departure times, closing their aircraft doors in time to ensure on-time departures. In fact, because scheduled carriers often are under significant pressures to avoid departure delays, they may depart without passengers or cargo if delayed. Non-scheduled carriers cannot depart without all of their passengers or cargo since the entire aircraft is chartered by the customer.

- Access to Crewmembers – Scheduled carriers can establish permanent crew domiciles and augment crews based upon organized, controlled departure and arrival times known months in advance. By contrast, non-scheduled carriers' operations generally are not frequent enough to warrant establishing permanent domiciles, so replacement crews needed to keep a trip moving must deadhead into crew change locations 12-24 hours ahead of transiting flights' predicted arrivals. If flights schedules are interrupted, those replacement crews may transition into reserve status, leaving non-scheduled carriers with limited options due to reserve and flight duty period limits.

- Crew Efficiency – Because non-scheduled carriers do not control their own schedules, their monthly fleet utilization and operating hours per aircraft generally are substantially less than for scheduled carriers. Many non-scheduled carriers fly only 200-250 hours per month per aircraft, compared to 400 hours per month for scheduled carriers. As a result, the average hours flown by crewmembers for non-scheduled carriers (50 hours per month) are much lower than those flown for scheduled carriers (75 hours per month), and more long-call reserve crews are used. Scheduled carriers control their flight schedules and put out crew bid sheets months in advance. This allows them to utilize their crews and fleet efficiently by organizing regular crew changes at established stations rather than calling on reserve crews. Scheduled carriers also can more closely predict crew reserve availability periods (permitting shorter reserve hours) than can non-scheduled carriers because scheduled carriers control their flights' departure times.

Under current Subpart S governing non-scheduled service, crew members require rest based on flying or duty that has already occurred; they must have rest based on what they have done; non-scheduled airlines "look back." See, e.g., 14 C.F.R. §§ 121.503(a) & (b) (looking back to determine whether 16-hour rest period is required in unaugmented operations); §§ 121.521(a) & (b) (looking back to determine whether 18-hour rest period is required in augmented operations). Scheduled operations, by contrast, "look forward" to future flying to determine whether the crew will have adequate rest to begin duty. Thus, crew scheduling for non-scheduled and scheduled operations are diametrically different.

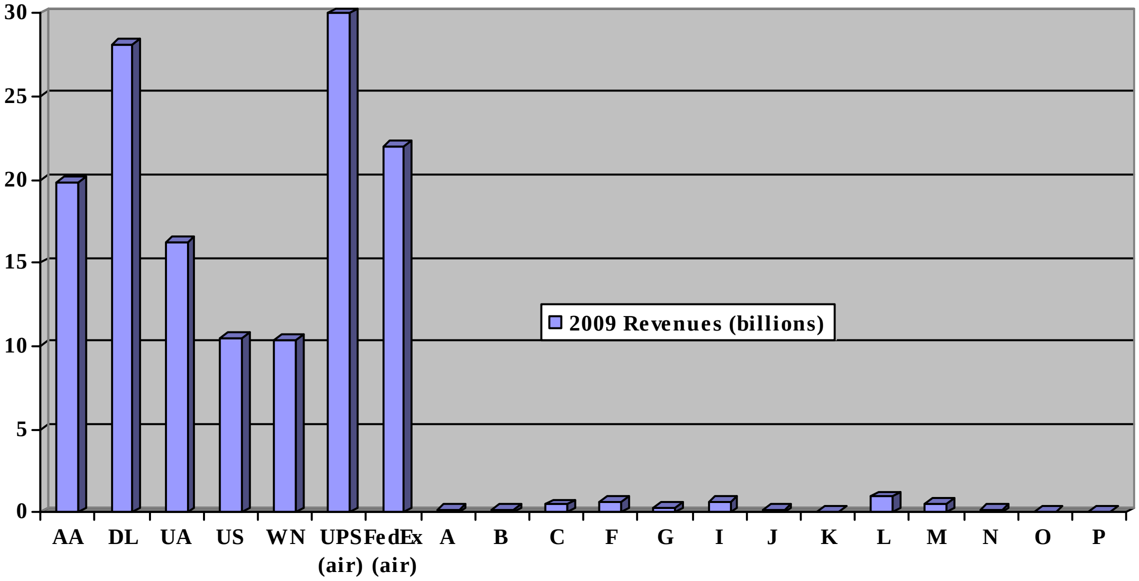
In addition to operational differences, the business models of non-scheduled carriers are very different from large scheduled carriers. Unlike most scheduled carriers, non-scheduled carriers are almost exclusively small companies, with fewer than 1,500 employees each. Of NACA's thirteen non-scheduled member carriers, three have 750-1,400 employees each, six have 400-750 employees each, and four have just 50-400 employees each. This pales in comparison to large scheduled carriers, each of which has tens of thousands of employees. There are just **8,280 employees** currently employed by **all 13 NACA non-scheduled carriers.**

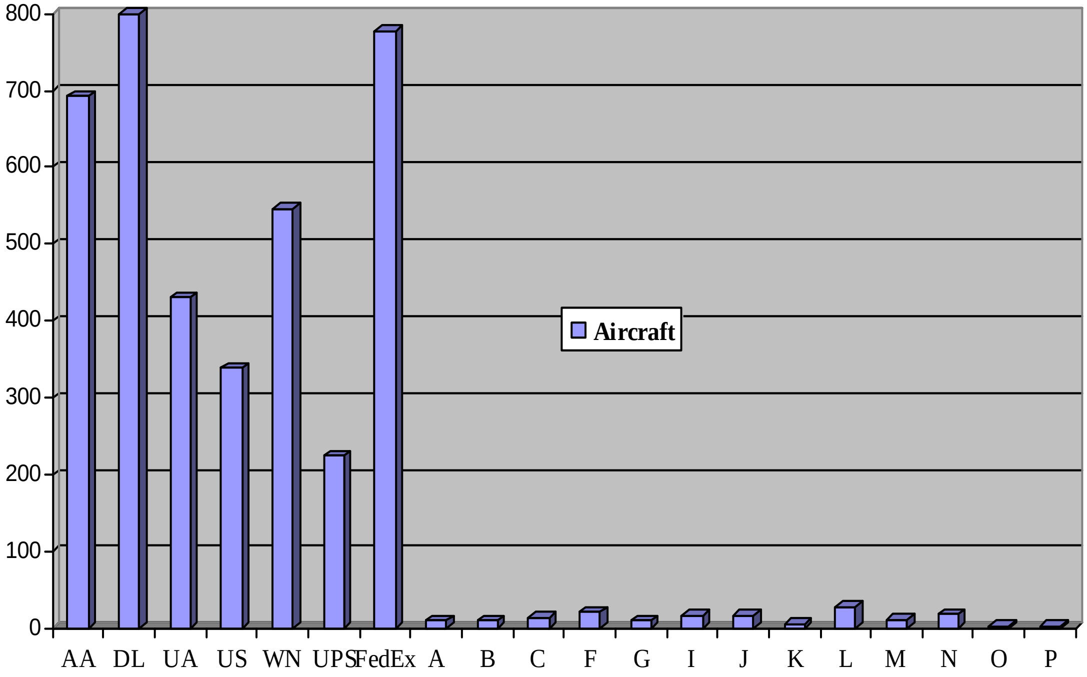
Revenues of NACA's non-scheduled member carriers are substantially less than the revenues of large scheduled carriers. The 2009 revenues of large passenger carriers such as American, Delta, United, US Airways, and Southwest, and large cargo carriers such as UPS and FedEx, range from $10 billion to $30 billion, whereas NACA's non-scheduled member carriers had revenues of only $25 million to $980 million each, and most had revenues of under $275 million. Total 2009 revenues for all thirteen NACA non-scheduled airlines was $4.661 billion. Similarly, the fleets of NACA's non-scheduled member carriers are quite small compared to large scheduled carriers: nearly all have fewer than 20 aircraft, in stark contrast to the 200-800 aircraft that comprise the fleets of American, Delta, United, US Airways, Southwest, UPS, and FedEx. The total number of aircraft in all thirteen NACA non-scheduled airlines is currently 172.

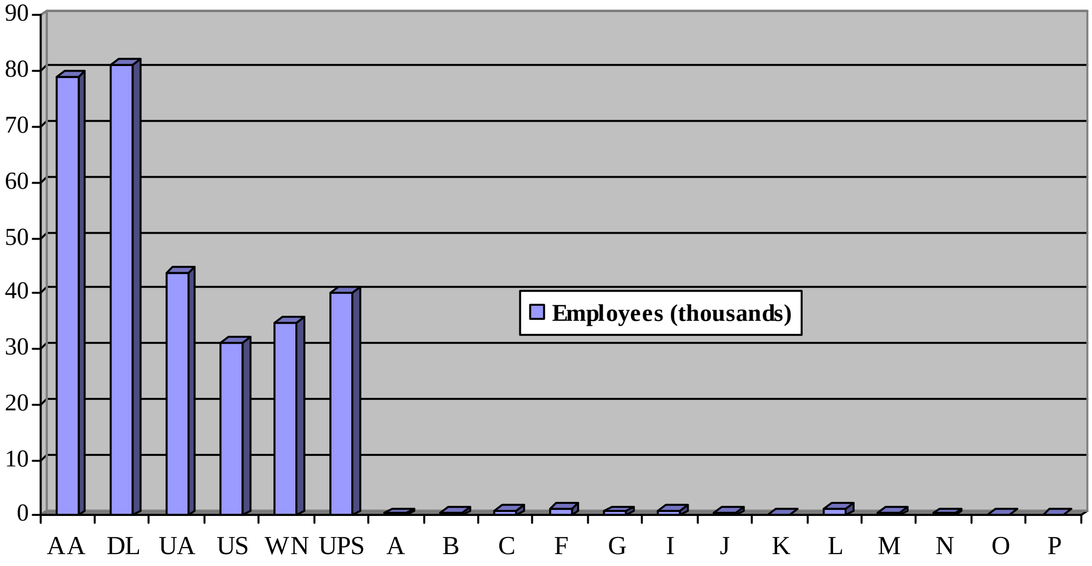
Even taken together, NACA's thirteen non-scheduled member carriers are only a small fraction of the size of large U.S. passenger and cargo carriers:

CARRIER	**2009 REVENUES** (BILLIONS)	**EMPLOYEES**	**FLEET SIZE**
American	$19.9	78,900	692
Delta	$28.1	81,110	799
United	$16.3	43,700	431
US Airways	$10.5	31,300	339
Southwest	$10.4	34,730	547
UPS (air only)	$30.0	40,000	225
FedEx (air only)	$22.0	**unavailable**	778
NACA's 13 Non-Scheduled Member Carriers *(combined)*	**$4.661**	**8,280**	**172**

Indeed, each NACA carrier (de-identified below as carriers A-P) is miniscule compared to these large carriers:







III. A One-Size-Fits All Approach Does Not Work for Non-Scheduled Carriers.

Given these vast differences, a one-size-fits-all approach to flightcrew duty and rest requirements as espoused in the NPRM does not work for non-scheduled carriers. The FAA has long recognized that non-scheduled carriers are vastly different from scheduled carriers. The FAA has had separate regulations governing non-scheduled carriers since the 1940s. Subpart S of Part 121 has existed in substantially the same form since the 1960s, setting forth requirements for supplemental (non-scheduled) operations. 14 C.F.R. Part 121, Subpart S**.** The FAA's regulations continue to clearly delineate between scheduled and non-scheduled operations. See 14 C.F.R. Part 121, Subparts Q, R, & S. The FAA also makes distinctions between scheduled and non-scheduled operations in addressing air traffic management and congestion at U.S. airports. See, e.g., Operating Limitations for Unscheduled Operations at John F. Kennedy International Airport and Newark Liberty International Airport – Disposition of Comments, Docket FAA-2008-0629, at 75 Fed. Reg. 64658 (Oct. 30, 2008).

Although the Civil Aeronautics Board, as a result of deregulation in 1978, made distinctions between scheduled and non-scheduled carriers less clearly defined from an **economic regulatory standpoint**, the distinctions remain clear from **marketing and operational standpoints**. Indeed, the operational distinctions are perhaps even more stark today than they were during the era of economic regulation of the U.S. aviation industry: many more carriers now operate scheduled service than non-scheduled service.

FAA Administrator Randy Babbitt has noted that a one-size-fits-all approach is not appropriate and may even be unsafe, observing that "[i]n rulemaking, not only does one size not fit all, but it's unsafe to think it can." Statement of Randy Babbitt, "We Can't Regulate Professionalism," ALPA Air Safety Forum (Aug. 5, 2009). And the FAA in this NPRM acknowledged the differences between scheduled and non-scheduled carriers: "The FAA recognizes there are different business models and needs that are partly responsible for the differences in the current regulations. It is sympathetic to concerns raised within the ARC by cargo carriers and carriers engaged in supplemental operations that new regulations will disproportionately impact their business models." 75 Fed. Reg. at 55857. But, the FAA goes on to make the completed unsupported statement: "However, the FAA also notes that the historical distinction between the types of operators has become blurred." Id.

Given the well-recognized differences between scheduled and non-scheduled carriers, a single set of regulations for both types of carriers makes no sense and is not supported by the NPRM or the public record. As noted in Section VI, infra, and by Dr. David Smith in **Appendix D**, the implication of these differences affects not only the validity of the Proposed Rule itself but also the FAA's economic analysis used to support the adoption of the Proposed Rule. Although the Proposed Rule may be fine for scheduled passenger and some limited cargo operations, an issue we leave to others, the FAA must promulgate regulations for all carriers or groups of carriers, including non-scheduled carriers, that address all carriers' needs for all operating environments.

IV. NACA's Proposal Provides A Reasonable and Realistic Alternative to the Proposed Rule for Non-Scheduled Operations

After extensive discussions with its members, NACA has created a proposal for non-scheduled operations (both augmented and unaugmented) that, if the FAA insists upon changing Subpart S, would be appropriate to adopt in a separate rulemaking action. NACA's Proposal, set forth in detail in **Appendix A**, has the following critical components:

- NACA's Proposal does not impose a single set of identical flightcrew duty and rest requirements on all carriers and addresses, scientifically, the significant differences between scheduled and non-scheduled carriers.
- NACA's Proposal for unaugmented and augmented non-scheduled operations is based on science and provides for the safety of flightcrews and carrier operations while also retaining the flexibility non-scheduled carriers need to continue to operate without unreasonable restrictions.
- NACA's Proposal can be applied to all non-scheduled operations by U.S. carriers worldwide.
- For unaugmented operations, NACA's Proposal sets a 14-hour flight duty period with the possibility of a 2-hour extension no more than twice in a 168-hour period, and never on consecutive days, with 16 hours of rest required if

the second extension occurs. NACA's Proposal reduces flight duty period limits by two hours, to 12 hours, for any period that encounters the Window of Circadian Low ("WOCL").

- For augmented operations with a Class 1 rest facility, NACA sets a flight duty period of 18 hours for a 3-pilot crew and 20 hours for a 4-pilot crew, with these maximums reduced by one hour for a Class 2 rest facility and two hours for a Class 3 rest facility. Because in-flight rest is available, and because science demonstrates that in-flight sleep mitigates fatigue over significant periods, no reduction of these hours is necessary when they encounter the WOCL.
- At nearly every turn, NACA's Proposal provides more fatigue mitigation than the FAA's Proposed Rule. For example, where the FAA would permit an extension of up to three hours in an augmented flight duty period, NACA permits only two hours. Although NACA's cumulative flight duty period in a 168-hour period exceeds that proposed by the FAA, NACA's built-in fatigue mitigation options ensure that pilots are better-rested throughout the entire flight duty period, and NACA also requires longer post-flight rest periods than the FAA does.
- NACA's Proposal does not contain flight time limits because these are not necessary given science-based flight duty period limits and fatigue-mitigating rest.

- NACA's Proposal may have longer flight duty periods than the FAA's Proposed Rule, but NACA's Proposal also has longer rest periods than the Proposed Rule, thus providing greatly enhanced fatigue mitigation.

NACA's Proposal provides significant fatigue mitigation that, in nearly all cases, is more stringent than the Proposed Rule. The increased rest requirements set forth in NACA's Proposal, together with its proposed flight duty period limits that reflect the unique nature of non-scheduled operations, demonstrate that NACA's Proposal would provide at least an equivalent level of safety to the Proposed Rule. Accordingly, should the FAA find it necessary to adopt changes to Subpart S, NACA requests that the FAA adopt NACA's Proposal.

V. The FAA's Proposed Rule Does Not Account for Non-Scheduled Carriers' Unique Operations.

The vast differences between scheduled and non-scheduled operations require different approaches to fatigue prevention and mitigation. Yet the Proposed Rule is a one-size-fits-all regulation, setting forth the same requirements for all types of operations. As explained below, the FAA's Proposed Rule is not a workable solution for non-scheduled operations. In addition, NACA has prepared specific proposals for redrafting each section of the proposed Part 117 that are attached hereto as **Appendix B**. If those changes are made, the revised Part 117 would be a reasonable and workable solution for non-scheduled operations. NACA has also prepared answers to the questions posted by the FAA in the NPRM that attached hereto as **Appendix C**.

A. The FAA's Conclusion that the Distinction Between Scheduled and Non-Scheduled Operations Has "Become Blurred" is Wrong.

All fatigue may be the same for all flightcrew members, but all types of flying are not the same. The type of flying has a significant effect on a carrier's planning and a flightcrew member's rest abilities. As described above, non-scheduled carriers have unique operations and business models that are very different from scheduled carriers. In particular, the transportation industry, global commerce, and lift for the Department of Defense (and therefore national security) would be negatively impacted by the application of the FAA's Proposed Rule to non-scheduled operations. Simply put, non-scheduled carriers' critical air mobility missions for national security could not be carried out in timely, responsive, and cost-effective manner if the Proposed Rule for non-scheduled operations were to go into effect. Because non-scheduled carriers' destinations rarely have crew rest facilities available to provide for crew rest in the manner dictated by the Proposed Rule, if that rule were to take effect without the changes proposed by NACA, non-scheduled carriers would be forced to reduce or eliminate these important services or, at a minimum, significantly increase the costs for these services. Because most CRAF missions are performed by nonscheduled carriers, there are significant national security capabilities inherent in the FAA's current regulations for non-scheduled operations (14 C.F.R. Part 121, Subpart S) that support CRAF flying for the Department of Defense and many rigorous operations for other government agencies that must be preserved.

NACA attempted to submit documents to the ARC describing its carriers' unique operations and business models, as well as an alternative proposal, but the ARC did not accept those submissions. NACA, then, sent those submissions to the FAA directly. In the NPRM, the FAA recognized that non-scheduled carriers have different business models, but it claimed that the distinction between non-scheduled carriers and scheduled carriers has "become blurred." 75 Fed. Reg. at 55857. The entirety of the FAA's explanation is as follows:

> The FAA recognizes there are different business models and needs that are partly responsible for the differences in the current regulations. It is sympathetic to concerns raised within the ARC by cargo carriers and carriers engaged in supplemental operations that new regulations will disproportionately impact their business models. However, the FAA also notes that the historical distinction between the types of operators has become blurred. Cargo carriers conduct the vast majority of their operations at night, but passenger carriers also offer "red eyes" on a daily basis. Some carriers operate under domestic, flag or supplemental authority, depending on the nature of the specific operation. Additionally, in some instances, the FAA has authorizes a carrier to conduct supplemental operations under the flag rules. Today's proposal is designed to recognize the growing similarities between the kinds of operations and the universality of factors that lead to fatigue in most individuals.

The FAA provided no explanation for this blanket generalization and no reference to non-scheduled operations to support its statement. This is a wholly insufficient basis upon which to apply the Proposed Rule to non-scheduled carriers, which, as explained above, have entirely different business models than the rest of the industry. The Proposed Rule cannot be issued without a clear accommodation of the unique issues in non-scheduled operations.

B. The Proposed Rule Does Not Account for Extra Rest Opportunities That Exist in Non-Scheduled Operations.

The FAA's Proposed Rule also does not account for the extra rest opportunities that flightcrew members currently have in non-scheduled operations. Non-scheduled carriers have flexibility in their flight and crew schedules and rest opportunities because their customers essentially demand such flexibility by booking flights on very short notice. Indeed, although non-scheduled carriers cannot set their schedules and rest opportunities entirely in advance, the nature of their business allows them to provide extra opportunities for rest and fatigue mitigation that either are not taken into account by the Proposed Rule or effectively eliminated by it. Non-scheduled carriers "look back" when assigned flightcrew members to trips, ensuring they have had necessary rest opportunities. For example, under the current regulations, crew members at one of NACA's non-scheduled member carriers that provides non-scheduled service average 33.5 hours per month with average block hours per flight cycle of 5.81, meaning they would only operate 6 flights in a normal 20-day duty period, resulting in 14 days of rest. These 14 days far exceed current rest requirements in Subpart S. Yet the Proposed Rule does not take these types of long rest periods in non-scheduled operations into account.

C. Certain of the FAA's Proposed Limits Are Not Supported by Science.

The FAA claims sleep science supports the requirements it proposes, yet it admits that "sleep science has not been validated in the aviation context." NPRM, at 39. It is clear from even a cursory review of the FAA's explanation for its proposed requirements that many of them lack scientific basis. For example, the FAA has proposed flight time limits without any explanation of why such limits are scientifically necessary. In fact, flight time limits are **not** necessary given flight duty period limits, and the FAA's answers to questions on this topic indicate the complexity (and, ultimately, the impossibility) of scheduling around too many limitations. For the past two decades, the FAA and the industry have focused on transitioning away from regulations based upon flight time limits towards science-based regulations of flight duty periods. The FAA has provided no scientific foundation for reversing that progress and returning to flight time-focused regulations. NACA agrees with the concept of science-based, fatigue-mitigated prescriptive flight duty periods. Limits on flight duty periods will provide reasonable limits on actual flight time. The sleep scientists consulted by the ARC agree: Dr. Belenky stated that "duty time limitations are a stronger predictor of sleep and rest opportunities than flight time limitations," and Dr. Hursh concurred, observing that "duty time, and not flight time, is what limits pilots' opportunity to sleep," as it is duty time (and not flight time per se) that encroaches on longer rest periods. See Appendix F, Bibliography of Scientific Sources, No. 17, at 258.[5]

In addition, notably, international standards such as CAP371 and EASA Subpart Q do not contain daily flight limits. As the FAA acknowledges, it is required under the Trade Agreements Act "to consider international standards and, where appropriate, [use them as] the basis of U.S. standards." 75 Fed. Reg. at 55876; see also OMB Circular A-119 (directing federal agencies to "consider international standards in . . . regulatory applications"). Yet the FAA, in proposing flight time limits, strays from international standards without any explanation or foundation.

The FAA's proposed flight time limits are particularly out of step when applied to unaugmented crews in a three-person cockpit (two pilots and one flight engineer). Aircraft with three-person cockpits were engineered, manufactured, and certificated by the FAA based upon the industry's international scheduled and non-scheduled commercial air transportation needs. Current regulations, 14 C.F.R. Part 121, Subparts R

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[5] NACA reviewed several sources of scientific information in formulating its Proposal. For ease of reference, a bibliography of those sources is attached hereto as **Appendix F**, and all references in the text to those sources cite to the source's number in that bibliography.

& S, recognize the added safety provided by the presence of the flight engineer, even though in some cases that person is not qualified to land the aircraft. While aircraft with three-person cockpits are no longer manufactured and airlines will eventually phase out those aircraft, this phase-out will not occur within the first several years of implementation of the Proposed Rule. There is no scientific basis for the FAA's failure to give credit for three-person cockpit crews and, therefore, no reason to effectively destroy the viability of those aircraft prematurely.[6]

The FAA also has provided no scientific justification for prohibiting any credit for rest in coach seats. In fact, sleep scientists reached the opposite conclusion: Dr. Hursh concluded that sleep in a coach seat was worth "approximately 50 percent of the value of normal sleep." Appx. F, No. 17, at 260. The FAA has not explained why it disregarded this conclusion and instead proposed no credit at all for rest in coach seats. This exclusion is onerous in light of the fact that the FAA co-sponsored a well-known scientific study with NASA that concluded that rest in seats that do not rise to the FAA's proposed requirements for Class 3 rest facilities is nevertheless effective in fatigue mitigation. See Appx F, No. 26. This conclusion is particularly burdensome upon non-scheduled carriers that operate flights in which only a coach seat generally is available for crew rest. For U.S. non-scheduled carriers that cannot add Class 1 or 2 rest facilities, the FAA's Proposed Rule would result in a substantial competitive disadvantage vis-à-vis

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[6] There is no evidence that the FAA considered the significant increased costs as a result of the elimination of credit for three-cockpit crews in those aircraft in the RIA.

foreign carriers because U.S. carriers could not fly the same operations with the same crew scheduling, all because of a prohibition that has no scientific basis.[7]

It is not only inappropriate to impose these requirements with no scientific foundation – it is a violation of federal law to do so. Indeed, the Data Quality Act, 44 U.S.C. § 3516, requires every federal agency to base its rules on the best available science. On October 1, 2002, the Department of Transportation ("DOT") issued agency guidelines to ensure the quality of scientific information it disseminates. See DOT Information Dissemination Quality Guidelines (Oct. 1, 2002). Thus, to the extent that the Proposed Rule is not based on the best available science, it violates the Data Quality Act.

D. A Fatigue Risk Management System, in Conjunction with the Proposed Rule, Is Not A Sufficient Solution.

The FAA's proposed Fatigue Risk Management System ("FRMS") requirements, while laudable, cannot save the Proposed Rule. NACA fully supports the concept of using an FRMS for fatigue management and risk mitigation, but it must be based on flight and duty time regulations that address the requirements of each segment of the affected community, including non-scheduled operations. To have any realistic impact, FRMSs must be uniform, predictable, and applicable to all environments, not granted on a case-by-case or segment-by-segment basis. As drafted, however, the FAA's proposed

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[7] These competitive hindrances are directly contrary to the Department of Transportation's statutory policy goals of "placing maximum reliance on competitive market forces and on actual and potential competition," "encouraging, developing, and maintaining an air transportation system relying on actual and potential competition – (A) to provide efficiency, innovation, and low prices; and (B) to decide on the variety and quality of, and determine prices for, air transportation services," and "strengthening the competitive position of air carriers to at least ensure equality with foreign air carriers, including attainment of the opportunity for air carriers to maintain and increase their profitability in foreign air transportation." 49 U.S.C. §§ 40101(a)(6), (12), (15).

FRMS regulation does not fit that criteria. There simply is no way for the FAA to act uniformly in approving and monitoring all FRMSs, and the FAA's history in managing similar programs suggests that its approval of nearly identical programs will vary, which will inevitably lead to competitive advantages and disadvantages among carriers. NACA can foresee a future under the Proposed Rule in which each non-scheduled carrier has a separate FRMS with different requirements for the same types of operations, preventing the uniformity needed to compete in the area of operations. FAA personnel tasked with approving or monitoring compliance with carriers' FRMSs inevitably will reach different conclusions as to what is permitted, which will cause variation among carriers of the same type. For example, if two carriers are bidding for the same flight, but the carriers' FRMSs are materially different in a way that affects the flight at issue, then the carrier with the less restrictive FRMS will likely have a competitive advantage. Even if the FRMSs are identical, the implementation and interpretation of those FRMSs by each carrier's Principal Operations Inspector are unlikely to be uniform. Simply put, each FRMS and its interpretation will be so individualized that, when taken together with the rest of the Proposed Rule, it is not workable.

So far, the proposed FRMS requirements are too uncertain and undefined to know whether they could be workable. NACA's carriers have no idea what the elements of the FRMS approval process will be, particularly as to non-scheduled carriers. The FAA has not indicated how the FRMS approval process for non-scheduled operations may differ from scheduled operations. Until these requirements are further developed, the FRMS cannot be relied upon as a viable method of compliance with the Proposed Rule.

In addition, the FAA has indicated, in response to questions for clarification, that it intends the FRMS to be route-specific and limited to individual flight segments. See Responses to Questions, Document FAA-2009-1093-0365, at 7, 12 (Oct. 22, 2010) ("Questions Response"). An FAA official indicated at a NACA Safety/Security Council meeting that the FAA will likely require 30-40 flights on a specific route segment as a condition of considering a deviation from the Proposed Rule, in accordance with an airline's FRMS. If this is so, then the FRMS has no value for non-scheduled carriers to allow flexibility within the Proposed Rule: as explained above, non-scheduled operations generally do not involve regular flights between the same locations and therefore it is either not possible or cost- and time-prohibitive for those carriers to obtain approval for every possible flight sequence. Further, with respect to military flights, the FAA states in its response to clarifying questions it is not possible to define "unsafe area" with any specificity, but, at the same time, it will not allow operations into "safe areas" in support of the U.S. military to invoke the proposed exception. So, how is a carrier to know whether a particular flight is into an "unsafe" or "safe" area and whether it can apply for a deviation under its FRMS?

E. Deviation Authority Is Insufficient for Non-Scheduled Operations.

The FAA's proposed case-by-case deviation authority also is insufficient to address the recurring special needs of non-scheduled carriers. Non-scheduled carriers do not typically fly the same routes or to the same destinations, and even when they do, those flights generally are not on the same schedules. It therefore is unworkable and unrealistic to require non-scheduled carriers to obtain special permission for each flight that requires operations beyond the limitations in the Proposed Rule.

The FAA's administration of deviation authority on a case-by-case basis will also lead to inconsistent applications because decisions will be made by personnel at the FAA's headquarters in consultations with the FAA's Principal Operations Inspectors across the country. If so, how will the FAA ensure uniformity in its decisions with respect to deviation authority? There is no way to ensure that these personnel will handle identical situations in different areas and at different times in the same manner.

F. The Proposed Rule Will Severely Curtail the Flexibility that Non-Scheduled Carriers Need In Their Operations.

Under the Proposed Rule, non-scheduled carriers will have much less flexibility in their operations, which will dramatically impact their business models, possibly making it impractical to continue to operate certain missions on the same schedule on which they are operated today. Any reduction in non-scheduled carriers' flexible capacity as a result of the Proposed Rule will ripple through all aspects of the transportation industry and would greatly harm the traveling public by reducing air capacity and schedule flexibility, and correspondingly increasing costs for the carriage of persons, property, and mail worldwide. The FAA states that carriers will be able to pass on increased costs on DOD missions to DOD. See 75 Fed. Reg. at 55875, n.52. This claim is highly suspect. DOD has announced a major cost reduction campaign, and Air Mobility Command ("AMC"), which controls CRAF missions, has told participating carriers to prepare for continuing reductions. DOD actually has proposed a reduction in the blended rate for cargo and passenger operations of up to 10% for the 2011 Fiscal Year contract. It is unclear how DOD will react to increased costs forecast by non-scheduled carriers from the Proposed Rule.

The Proposed Rule would have severe implications on the non-scheduled carriers' ability to serve U.S. military and humanitarian efforts worldwide and would ultimately weaken those efforts. One NACA non-scheduled member's experience provides a real-life, current example. This carrier typically flies between Ramstein, Germany and Al Udeid, Qatar with a flighty duty period of 17 hours and 35 minutes. Under the Proposed Rule, because it is not possible to change crews in Al Udeid, that carrier can only operate this flight if it uses a 4-pilot crew, a B747-400 (with a Class 1 rest facility), a duty period beginning in Ramstein between 0700 and 1259 local time, and only acclimated flightcrew members. This carrier does not operate B747-400 aircraft. In addition, under the Proposed Rule, this carrier would not be able to continue its operations from Frankfurt (Hahn Airport) to Bagram Air Force Base, and on to other locations. It is not clear where the carrier would be able to fly from Bagram. Although proposed section 117.31 allows carriers to exceed applicable flight duty period limits during operations into "unsafe areas," it remains unclear whether this section would apply to that carrier's planned missions to Bagram (because the FAA claims it is not possible to define "unsafe areas" with any specificity). Section 117.19, which restricts the length of flight legs that can be augmented, would add another layer of complexity to this operation because it would be difficult to find a destination from Bagram to which a flight will last at least 3 hours and still remain within the proposed flight duty period limits.

The Proposed Rule's restrictions will make it difficult for non-scheduled carriers to fly to Diego Garcia, a key point in the Indian Ocean used in military operations, due to the inability of those carriers to pre-position crews there. Additionally, at least one carrier's current operations to Bishkek and Kuwait will have to be modified to comply with the Proposed Rule, with attending increased costs, because they exceed the proposed flight duty period limits and often are delayed due to weather or limited parking slot availability. Increased travel interruptions to those locations as a result of the Proposed Rule will have a direct negative impact on the movement of U.S. troops.

VI. The FAA Failed to Fully Consider the Costs of the Proposed Rule on Non-Scheduled Carriers in its Regulatory Impact Analysis.

The FAA is required by Executive Order 12866 (58 Fed. Reg. 51735 (Oct. 4, 1993)) to "assess both the costs and benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs." 58 Fed. Reg. at 51736. Then, the FAA must "design its regulations in the most cost-effective manner to achieve the regulatory objective." Id.

As an initial matter, the FAA's own skewed cost-benefit analysis in the RIA actually does not find that the benefits outweigh the costs of the Proposed Rule. Indeed, the FAA concluded that the Proposed Rule will cost $1.254 billion for the entire industry over ten years, while the benefits will total only $659-837 million. See RIA, at 2. That alone is reason enough for the FAA to return to the drawing board on this issue.

Even if the FAA had concluded that the Proposed Rule's benefits outweighed its costs, however, it still cannot go forward because the FAA failed to consider almost all operations by non-scheduled carriers. As demonstrated below, the Proposed Rule will impose substantial, nearly life-threatening costs upon non-scheduled carriers. The FAA failed to consider almost all non-scheduled carriers' costs in its analysis. Therefore, the Proposed Rule, as currently drafted, cannot go forward as to non-scheduled carriers.

A. The Proposed Rule Will Have a Significant Financial Impact on Non-Scheduled Carriers.

Because most non-scheduled carriers are small companies without the ability to absorb significant cost increases or pass on those costs to customers due to competitive forces from foreign carriers, the Proposed Rule's increased costs would have a significant financial impact on non-scheduled carriers that is not recognized by the FAA in the RIA.

NACA collected detailed cost data from its 13 non-scheduled member carriers, which indicated projected costs if the Proposed Rule were finalized in its current form. These projected costs represent a significant, almost life-threatening burden on NACA's non-scheduled member carriers driven, principally, by **an increase of 42% in the number of additional flightcrew members** projected to be needed. Indeed, one NACA member estimated that its crew costs alone would increase by over 100% under the Proposed Rule. The total estimated increased costs and lost revenue for NACA's thirteen non-scheduled member carriers to comply with the Proposed Rule would be **$3.698 billion** over ten years. This estimate for NACA's thirteen non-scheduled member carriers is **nearly three times more** than the FAA's estimated cost of $1.254 billion for the entire industry.

NACA's non-scheduled member carriers prepared estimates for non-recurring start-up costs covering the time period during which they would prepare their operations for the effectiveness of the Proposed Rule. Carriers also estimated their recurring costs for the first operational ("normalized") year the Proposed Rule would be in effect and every year thereafter, with no change in flight services. Representatives of carriers' operations and safety departments along with NACA staff jointly met and engaged in conference calls to assess the impact of the Proposed Rule on each airline's flight operations. Conclusions and assumptions derived from those deliberations were then passed on to each carrier's financial planning staff to calculate the attendant costs in 25 detailed categories. Principal categories of costs estimated to accommodate the Proposed Rule's requirements included:

1. new pilots (compensation and fringe benefits);
2. training (initial upgrades, recurrent, and fatigue);
3. onboard rest facilities (installation in aircraft and, where applicable, loss of revenue);
4. operational and human resources costs (e.g., reserve crew limitations, overnight stays and per-diem fees, deadheading, traveling ground service supervisors, and labor negotiations); and
5. administrative and equipment upgrades (software and personnel).[8]

Several carriers also estimated their lost revenue from lost charter flights as a result of increased costs, inability to perform current flights, or lost revenue due to fewer seats available because of installation of crew rest facilities.

In the aggregate, total forecast costs of NACA's thirteen non-scheduled member carriers to comply with the Proposed Rule and lost revenue are as follows:

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[8] In particular, the modification of scheduling software would be extremely costly and time-consuming for non-scheduled carriers, which do not have the same financial and personnel resources to make those modifications as larger carriers.

START-UP YEAR (NON-RECURRING) COSTS FOR 2013

13 Non-Scheduled Carriers

CATEGORY	**TOTAL COSTS (MILLIONS)**
New Pilots	$137.465
Training	$46.442
Installation of Onboard Rest Facilities	$63.958
Operational and Human Resources	$134.808
Administrative and Equipment Upgrades	$11.450
Lost Revenue (incl. from rest facilities)	$95.063
TOTAL	**$489.186**

NORMALIZED YEAR (RECURRING ANNUAL) COSTS FOR 2014-2022

13 Non-Scheduled Carriers

CATEGORY	**TOTAL COSTS (MILLIONS)**
New Pilots	$135.266
Training	$14.855
Operational and Human Resources	$137.627
Administrative and Equipment Upgrades	$8.243
Lost Revenue (incl. from rest facilities)	$60.524
TOTAL	**$356.515**

Thus, the total costs and lost revenue that NACA’s thirteen non-scheduled member carriers will incur over ten years to comply with the Proposed Rule are:

TOTAL COSTS FOR 2013-2022
13 Non-Scheduled Carriers

CATEGORY	TOTAL COSTS (MILLIONS)
New Pilots	$1,354.859
Training	$180.137
Installation of Onboard Rest Facilities	$63.958
Operational and Human Resources	$1,373.451
Administrative and Equipment Upgrades	$85.637
Lost Revenue (incl. from rest facilities)	$639.779
TOTAL	**$3,697.821**

Given these carriers' status as small businesses, the financial impact of the Proposed Rule will be particularly devastating. NACA's non-scheduled member carriers' forecasted costs indicate that **the Proposed Rule will add $3.698 billion in new costs and lost revenue over ten years**. The Proposed Rule fails to consider the crushing impact of these costs on NACA's non-scheduled member carriers.

B. The Costs for Non-Scheduled Carriers to Comply with the Proposed Rule Are Significantly Higher Than What the FAA Calculated.

The costs of NACA's non-scheduled member carriers are significantly higher than what the FAA calculated for the Proposed Rule. The FAA estimated the total cost of the Proposed Rule to be $1.254 billion over ten years. See RIA, at 2. NACA's thirteen non-scheduled member carriers' costs, listed above, are significantly more than what the FAA estimated in the RIA for the ***entire airline industry***, which calls into question the accuracy of the FAA's cost calculations because non-scheduled carriers comprise only 14 percent of all Part 121 air carriers (RIA, at 80):

CATEGORY	FAA'S ESTIMATED COSTS[9] (MILLIONS)	NACA'S ESTIMATED COSTS (MILLIONS)
Flight Operations	$760.3	$2,728.31[10]
Schedule Reliability	$4.9	$85.637
Fatigue Training	$262.3	$180.137
Rest Facilities[11]	$226.6	$703.737
TOTAL	**$1,254.1**	**$3,697.821**

Overall, **the estimated total costs detailed above for NACA's thirteen non-scheduled member carriers *alone* are *nearly three times* the FAA's estimate of the total cost of the Proposed Rule for the *entire industry***. See RIA, at 2. These comparisons cast serious doubt on accuracy of the FAA's estimate. The FAA appears to have substantially underestimated the costs of the Proposed Rule, at least as to non-scheduled carriers, and the rule should not go forward without a more accurate calculation of its likely costs.

C. The FAA Failed to Fully Consider These Costs for Non-Scheduled Carriers in the RIA.

The FAA failed to fully consider the costs of virtually all non-scheduled carriers to comply with the Proposed Rule. In fact, the FAA did not even attempt to quantify these costs for non-scheduled carriers.[12] Instead, the FAA arbitrarily assigned non-

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[9] The FAA did not include any cost for its FRMS requirements, although it estimated those costs at $800,000 to $10 million per carrier per year for ten years. Id., at 74.

[10] This figure includes estimated new pilot and operational/human resources costs.

[11] Including estimated lost revenue.

[12] Atlas Air, NACA's largest member carrier, is only approximately 3 percent of the size of large cargo carriers FedEx and UPS. Most of Atlas's service consists of ACMI

scheduled carriers to the large cargo carriers group for purposes of estimating certain costs and, in other calculations, apparently did not even acknowledge the existence of non-scheduled carriers. See generally RIA. Indeed, in grouping non-scheduled and large cargo carriers together, the FAA ignored that large cargo carriers are, on average, over **40 times** the size of non-scheduled carriers. This failure to recognize the magnitude of this difference falls far short of the FAA's obligation under Executive Order 12866 to assess all of the costs of the Proposed Rule and make a "reasoned determination that the benefits of the intended regulation justify its costs."

D. The Proposed Rule's Costs for Non-Scheduled Carriers Far Outweigh Its Benefits.

Given the significant costs summarized above of NACA's non-scheduled members to comply with the Proposed Rule, the Rule as written cannot be economically justified. This is because these costs far outweigh the benefits of the Proposed Rule as to non-scheduled carriers.

To determine the benefits of the Proposed Rule, the FAA evaluated air carrier accidents over the past 20 years[13] and used that accident data to estimate the likely number of future accidents and corresponding fatalities if the current regulations were left unchanged. To arrive at a monetary value of the benefits of avoiding those future fatalities, the FAA assigned a statistical value to each life (which was inexplicably higher

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contracts for "scheduled" operations. Atlas submitted data to the FAA as part of the ARC discussions and it is presumably included in the FAA's analysis. What is clear is that data from Atlas could not have justified the conclusion reached by the FAA that non-scheduled carriers are similar to large cargo carriers.

[13] Although the FAA calculated the Proposed Rule's costs for only 10 years, it calculated the Proposed Rule's benefits by considering accidents going back nearly 20 years. The FAA did not explain this imbalance. Even with this imbalance of data, however, the Proposed Rule's benefits do not justify its costs as to non-scheduled carriers.

than the DOT-mandated value to be used in such calculations), and then multiplied that value by the number of fatalities that the FAA estimated would be avoided under the Proposed Rule. See RIA, at 2-65.

The FAA's estimated benefits of the Proposed Rule is not the appropriate figure to use for non-scheduled carriers because it is based on all accidents, not just those in non-scheduled operations. In fact, had the FAA separately considered the accident history of non-scheduled carriers, they would find only one fatigue-related accident in non-scheduled operations from January 1, 1999 to January 1, 2009: FedEx at Tallahassee, Florida (TLH) in 2002 (NTSB: DCA02MA054). There were no fatalities and flightcrew members had the required pre-flight rest opportunities under the current regulations. In fact, an analysis of the facts underlying this accident reveals that the pilot at issue reported for duty in a state of fatigue despite scheduled two full days of rest, an amount far greater than the amount of rest required under the current regulations or proposed by the FAA here. As the FAA pointed out in analyzing this accident in the RIA, the pilot's fatigue was not related to scheduling issues and would not have been mitigated by the prescriptive flight duty periods in the Proposed Rule. NACA believes that the issues related to this pilot's fatigue would be best mitigated through better fatigue training and pilot discipline under a carrier's Fatigue Risk Management Plan. Non-scheduled carriers should not be burdened with heightened obligations to monitor flightcrew members' rest periods based on this one accident, when the carrier was reasonable in assuming that the pilot at issue would be sufficiently rested for the flight after having two days off. Carriers simply cannot know or reasonably be required to determine whether such rest would be insufficient to mitigate the flightcrew member's fatigue. This accident is a perfect example of why carriers cannot be responsible for or reasonably control a flightcrew member's actions during his or her time off duty. The burden must be on the professionals to be just that – professional – and report for duty rested as required by the regulations.

Moreover, there were **no accidents** in non-scheduled carriers' augmented operations during that time period. NACA has also analyzed all 43 of the accidents discussed in the RIA and was unable to find any accidents reported from augmented operations. Thus, there would no lives saved from the Proposed Rule in non-scheduled operations. As a result, there would be **no benefit** (or, at most, minimal safety benefits) from the Proposed Rule as to non-scheduled carriers, and any costs they would incur from the Proposed Rule would make it unjustified, particularly when those costs could be better spent by carriers on overall safety, maintenance, and training programs. Here, however, the costs to NACA's non-scheduled member carriers to comply with the Proposed Rule would be astronomical. These staggering costs overwhelmingly exceed the rule's benefits for non-scheduled operations. It is therefore inappropriate to apply the Proposed Rule to non-scheduled operations.

E. The FAA Failed to Provide the Underlying Data It Used in Its Calculation of the Costs of the Proposed Rule, In Violation of the Administrative Procedure Act.

The FAA owes those who are impacted by this proposed rule a full and complete disclosure of the materials upon which it has relied in drafting the Proposed Rule, the NPRM, and the RIA. This is particularly true given that the costs estimated by NACA's non-scheduled member carriers to comply with the Proposed Rule are significant higher than the total industry costs estimated by the FAA. Yet the FAA has wholly failed to provide any of the underlying data upon which it based its cost calculations, even in de-identified form. This is directly contrary to its statutory obligation under the Administrative Procedure Act, which requires the FAA to provide the underlying data and studies upon which it relies in its rulemaking.

It is well-established that, under the Administrative Procedure Act's notice and comment requirements, *see* 5 U.S.C. § 553, "[a]mong the information that must be revealed for public evaluation are the 'technical studies and data' upon which the agency relies [in its rulemaking]." *Am. Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 236 (D.C. Cir. 2008) (citing *Chamber of Commerce v. SEC*, 443 F.2d 890, 899 (D.C. Cir. 2006)); *see also Portland Cement Ass'n v. Ruckelshaus,* 486 F.2d 375, 393 (D.C. Cir. 1973) ("It is not consonant with the purpose of a rule-making proceeding to promulgate rules on the basis of inadequate data that [to a] critical degree, is known only to the agency."). Indeed, "[i]n order to allow for useful criticism, it is especially important for the agency to identify and make available technical studies and data that it has employed in reaching its decisions to propose particular rules." *Am. Radio Relay League, Inc.*, 524 F.3d at 236 (citing *Conn. Light & Power Co. v. Nuclear Regulatory Comm'n*, 673 F.2d 525, 530 (D.C. Cir. 1982)). "To allow an agency to play hunt the peanut with technical information, hiding or disguising the information that it employs, is to condone a practice in which the agency treats what should be a genuine interchange as mere bureaucratic sport. An agency commits serious procedural error when it fails to reveal portions of the technical basis for a proposed rule in time to allow for meaningful commentary." *Conn. Light & Power Co.*, 673 F.2d at 530-31 (citing cases).

Here, the FAA's failure to provide this basic information does just that – it effectively ensures that no interested person or entity can assess the FAA's analysis and file meaningful comments on the Proposed Rule. A close reading of the NPRM, the RIA, and the materials the FAA placed in the record discloses significant omissions of basic information that must be made available before any affected person or entity can meaningfully comment. As detailed below, the RIA includes numerous assumptions as to the economic benefits and costs of the proposed rule, but, in the cost analysis, there is little or no information as to the basis for those conclusions. Without the basic data, work papers, and backup studies that support those conclusions, it is impossible for NACA to critically assess and meaningfully comment on any of the conclusions.

F. The FAA Did Not Consider the Costs or Benefits of Retaining Subpart S for Non-Scheduled Operations.

Under Executive Order 12866, the FAA is required to assess "all costs and benefits of available regulatory alternatives, including the alternative of **not regulating**." See 58 Fed. Reg. at 51735 (emphasis added). NACA repeatedly advised the FAA, both directly and through the ARC, that it would be appropriate, given the unique nature of non-scheduled operations, to continue the applicability of the flight and duty regulations set forth in Subpart S of Part 121, regardless of what the FAA chose to do with regard to scheduled operations. Yet despite its obligation to consider this available alternative and NACA's repeated requests to consider this option, the FAA did not do so. Nowhere in the NPRM or RIA does the FAA assess the costs and benefits of retaining the current Subpart S for non-scheduled operations.

As NACA explained in its previous submissions, Subpart S currently provides adequate safeguards for flightcrew duty limitations. See 14 C.F.R. §§ 121.500-121.525.

The current Subpart S also incorporates fatigue mitigation principles, including rest requirements, throughout the duty day. This regulatory scheme has proven to be successful for non-scheduled operations while maintaining an equivalent level of safety; as explained above, there has been only one fatigue-related accident in unaugmented non-scheduled operations from January 1, 1999 through January 1, 2009 that would not have been prevented or mitigated under either the current regulations or the Proposed Rule, and there have been no fatigue-related accidents in augmented non-scheduled operations during that time. This exemplary safety record shows that the current Subpart S is working. Yet the FAA inexplicably gave no consideration to retaining Subpart S in its current form as an available regulatory alternative.

VII. The FAA's Benefit Analysis in the RIA is Fundamentally Flawed

NACA asked Economists, Inc. to review the benefit analysis in the RIA. The report is attached hereto as **Appendix D**. Dr. David D. Smith's critique of the benefit analysis points out the following major issues with the FAA's assumed benefit from the implementation of the Proposed Rule: (1) the FAA doubles the value of a "statistical life" without any foundation; (2) the FAA assumes a value for damage on the ground from accidents that has no supportable foundation and for which there is no basis to apply the damage to non-scheduled operations; (3) the FAA exaggerates the value of accident "mitigation"; and (4) the FAA assigns fatigue as a cause of accidents even when there is no evidence of such a cause. These four erroneous assumptions are used by the FAA to justify its benefit analysis and cannot be accepted to support an analysis that, with all its flaws, does not establish that the benefits of the Proposed Rule outweigh its costs.

A. There is No Evidence Supporting a Value of a Statistical Life of $12.6 Million.

The FAA claims that 2009 guidance from DOT, consistent with OMB Circular A-4, suggests the Value of a Statistical Life ("VSL") is $6 million. See RIA, at 71; see also Dep't of Transp., Report: Treatment of the Value of a Statistical Life in Departmental Analysis (Mar. 18, 2009). The FAA also states that recent literature is consistent with a VSL value of $8.4 million. Id. But the FAA then states that "[i]f the value of an averted fatality were increased to $12.6 million, the present value of the benefits would equal the present value of compliance costs." Id., at 2. As Dr. Smith explains, this is not a relevant consideration because the value of an averted fatality is independent of and unrelated to the benefit-cost analysis. The FAA provides no evidence whatsoever showing that the appropriate VSL is $12.6 million. With a VSL of $6 million or even $8.4 million, the benefits of the Proposed Rule are heavily outweighed by its costs and cannot be adopted. This significant error invalidates the FAA's entire benefit analysis.

B. There is No Evidence Indicating How Much "Damage on the Ground" is Attributable to Flightcrew Fatigue.

The FAA attempts to boost its estimate of the benefits of the Proposed Rule by including benefits for "preventing minor aircraft damage on the ground and the value of well rested pilots as accident preventors and mitigators." As Dr. Smith explains, however, these additional benefits are speculative and have not been substantiated. The FAA claims that minor aircraft and equipment damage on the ramp "may involve much larger dollar losses than the few fatal accidents that occur." RIA, at 69 (emphasis added)., citing one estimate that put the cost of ground accidents at $5 billion per year worldwide, and at least $3 billion in the United States. Id. But there is no evidence indicating how much of this damage, assuming the number is even relevant, is attributable to flightcrew fatigue. The FAA concludes that, "[d]ue to data limitations, the FAA was unable to estimate the cumulative effect of preventing minor aircraft damage on the ground, but if the rule were to reduce damage by about $600 million over 10 years ($340 million present value) it would break even in terms of net benefits." Id., at 120 (emphasis added). This statement may be tautologically true, but there is no evidence supporting the $600 million figure.

C. The FAA Exaggerates Benefits from Accident "Mitigation"

The FAA states that "[w]hen an [aircraft] accident occurs, it is generally the result of a long chain of multiple failures. The flightcrew in the cockpit is generally the last opportunity to break the chain and prevent an accident." RIA, at 70. The FAA refers to stepping in to "break the chain" and prevent an accident as "mitigation." The FAA also says that "it is not possible to estimate the impact of increased problem solving capability from fewer fatigued pilots. It is, however, real and significant." Id., at 71. As Dr. Smith explains, this may be true as a tautological statement, but is of no value in an economic analysis. In fact, the FAA's entire analysis of these mitigation benefits is exaggerated and should be ignored. The FAA has failed to show how accidents that occur when the flightcrew fails to "break the chain" are different from, and in addition to, any other aircraft accidents already covered by their analysis. Without such correlation, the FAA's inclusion of benefits from accident "mitigation" is erroneous and unsupported.

In addition, the accidents in the original sample cannot be included together with those in the same sample that they deem would have been avoided. Only the fatigue-related accidents can be used, yet the FAA appears to have included all accidents in estimating the "mitigation" benefits. The FAA can only count mitigation as a benefit of the Proposed Rule if a flightcrew member's failure to "break the chain" is the result of fatigue. Without any data supporting that the break in the chain preventing future accidents is due to a flightcrew member being rested, the FAA cannot include credit for such mitigation in its benefit analysis, and its inclusion of such credit exaggerated the FAA's estimate of the benefits of the Proposed Rule.

D. There is No Justification for Concluding that Accidents Caused by Flightcrew Fatigue are 4 to 6 Times Larger Than the Evidence Shows

The FAA also improperly inflates the estimated benefits of the Proposed Rule by assuming the Rule would prevent an additional portion of pilot error accidents even though in the past these accidents were not known to have been caused by fatigue. As Dr. Smith explains, the FAA adds 77.2 accidents to the known 13 for passenger flights (over a period of 20 years) for a total over 90. RIA, at 50. It also adds 22.6 accidents to the known 5.8 figure for cargo flights (over a period of 20 years) for a total over 28. Id., at 53. To come up with these large estimates, the FAA started with the figures for accidents known to be caused by fatigue as the lower bounds for its estimates of future accidents.[14] Id., at 55. It is difficult, and in this case wholly unsupported, to justify upper bounds that are 4 to 6 times larger than these figures (22.6 relative to 5.8 and 77.2 relative

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[14] The FAA determined that pilot fatigue was present in 13 of the 33 passenger accidents (13/33=39.4%) for which it had enough information in the accident report to make a judgment about the presence or absence of pilot fatigue. RIA, at 50. The comparable figures for cargo accidents are 5.8 out of 10 accidents (5.8/10=58.0%). Id., at 53. The FAA then assumed that 39.4% of the 196 passenger accidents for which there was insufficient information to identify the cause of the accident were also caused by pilot fatigue. (39.4% of 196 is 77.2.) Id., at 50. Similarly, it assumed that 58.0% of the 39 cargo accidents for which there was insufficient information to identify the cause of the accident were caused by pilot fatigue. (58.0% of 39 is 22.6) Id., at 53.

to 13), since these estimates are based on sweeping in accidents not known to be caused by fatigue. It also assumes that the agency determining the cause of the accident as not including fatigue was in error.

E. The FAA Has Misinterpreted the Probability of All Benefits from the Proposed Rule

The FAA claims that there is only about a 7 percent probability that the benefits of the Proposed Rule would exceed the costs in nominal terms, or a 10 percent probability that the benefits would exceed costs in discounted terms. RIA, at 2. This is a misleading and irrelevant statement. As Dr. Smith explains, **a 10 percent probability that the benefits would exceed costs also means that there is a 90 percent probability that they would not**. Simulation models create a distribution of possible outcomes. Based on the particular assumptions underlying the model, the FAA's particular simulation model predicted results represented by the graphs on pages 44 and 48 of the RIA. By definition, there is a benefit number associated with every probability along the horizontal axis (be it 10 percent or something else).[15] But this does not mean that any of these numbers is relevant for comparing with costs in the benefit-cost analysis.[16] The FAA's model seems to assume that NACA carriers have the same costs as those it used in its simulation model. That assumption is wrong.

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[15] For example, the way to read the graph on page 44 of the RIA is that 10 percent of the black area under the graph is to the right of $1.25 million on the horizontal axis. The total black area under the graph represents 100 percent of the possible estimates from the simulation model.

[16] An example might help to clarify this point. Consider a baseball player with a batting average of .250. This is the mean of his historical hitting success. If asked to predict this player's future hitting success, we would use this mean, .250, as the best estimator. This does not mean that we think he will definitely bat .250 in the future, but this is our best estimate since it is the mean of his past performances. Based on historical data, we may also estimate that there is a 10 percent chance that this player will get 8 hits out of the

The best estimate of the costs of the proposed policy is a mean of possible cost estimates. For an apples-to-apples comparison, the mean benefits estimate should be compared to this mean cost number. According to the FAA's own assumptions, the model's best estimate of benefits from the proposed policy is $659.4 million ($463.80 million in present value). This is the mean estimate. Higher and lower benefits are possible than those associated with the mean estimate, but it is the expected value of the benefits (the mean benefits) that should be compared to the expected value of the costs. A 7% chance that the mean will be $659.4 million does not support the Proposed Rule when there is a 93% chance that it will be some other number significantly less.

F. The FAA Improperly Assumes the Proposed Rule Would Eliminate Accidents Attributable to Lack of Rest Before a Flight

As Dr. Smith found, the FAA also improperly assumes that if the new policy is adopted the number of airplane accidents attributable to lack of rest before a flight will drop to zero. The FAA states that "[t]he new requirements of this rulemaking, including increased training, would prevent these [five] accidents [identified as caused by fatigued flight crews] from happening in the future." RIA, at 17. This claim is untrue, because no rule can guarantee zero fatigue-related accidents. The FAA later admits that "fatigue is rarely a primary or sole cause of an accident, and therefore this rule, if adopted, is not likely to prevent all future accidents that include fatigue as a factor." Id., at 65.

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next 10 times at bat. If this is the case, it would be accurate to say that going forward he has a 10 percent chance of batting .800, but that does not make .800 the best estimate of his future batting success. That would still be .250.

G. The FAA's Simulation Model Has Not Been Shown to be Applicable to Non-Scheduled Carriers

When analyzing the role of duty time limits on flight safety, the FAA uses data from six carriers, including three large legacy passenger carriers and two large cargo carriers. RIA, at 18. There is no mention of using data from non-scheduled carriers. Because of the differences between scheduled and non-scheduled operations, as described above, the FAA model may have no relevance for predicting the benefits of the Proposed Rule in non-scheduled operations. Although Dr. Smith explains that, without examining the FAA's model in detail, it is not possible to know in what other ways it does not take into account characteristics that are specific to unscheduled airline operations, the FAA improperly uses a "one-size-fits-all" model even though all the sizes are not even known.

As described above, the differences between NACA's non-scheduled members' operations and the scheduled operations of large passenger and large cargo carriers likely cause NACA members to have different cost structures than the legacy passenger carriers and cargo carriers on which the FAA simulation model was built. It is important to analyze data for unscheduled flights to determine if such cost differences between them and legacy passenger/cargo carriers do exist. If the model does not test for these differences and then takes them into account where appropriate, any conclusions drawn from the model and applied to the NACA carriers are unsupported.

VIII. The FAA Made Numerous Unsupported Assumptions When Analyzing the Costs of the Proposed Rule.

Not only did the FAA apparently severely overestimate the benefits and underestimate the costs of the Proposed Rule, but it made numerous assumptions as to the costs of the Proposed Rule that have no foundation. Indeed, the FAA's analysis of the costs of the Proposed Rule consists of a series of unsupportable, paper-thin assumptions built on top of each other, none of which can withstand serious scrutiny.

To estimate the costs of Part 121 carriers to comply with the Proposed Rule, the FAA made numerous assumptions, all without any foundation provided. An outline of the assumptions made by the FAA in its cost calculations is attached hereto as **Appendix E**. Given the sheer volume and egregious nature of the assumptions made by the FAA, however, some examples bear mentioning.

In calculating crew scheduling costs, the FAA used two months of crew scheduling data from six carriers, including three large legacy passenger carriers and two large cargo carriers. See RIA, at 75. Yet, without explanation, the FAA assumed that data was applicable to all types of carriers, including non-scheduled carriers, and it calculated costs based solely on that data and its manipulations thereof. In addition, the FAA divided all Part 121 carriers into seven groups based on their size and operating characteristics. Each of the size carriers supplying data was assigned to a group, and all types of carriers were represented except for small passenger, small cargo, and charter passenger carriers (i.e., non-scheduled carriers). The data supplied represented only 23% of all Part 121 flightcrew members. Yet, without explanation, non-scheduled carriers were arbitrarily assigned to the large cargo group on the grounds that their operations were most similar. RIA, at 80. As explained above, NACA's non-scheduled member carriers are vastly different from large passenger and cargo carriers. In particular, large cargo carriers FedEx and UPS are at least **40 times larger** than NACA's non-scheduled member carriers. There simply is no basis for the FAA's grouping of non-scheduled charter carriers with large cargo carriers.

Similarly, in calculating flight operations costs, the FAA considered only large cargo aircraft (B727[17] and B747) and extrapolated the data it had on those aircraft to the entire industry. See RIA, at 91. In estimating the cost savings from augmented operations, the FAA even admitted that it "needed to make several assumptions and the resulting cost estimate is highly uncertain," id., at 97, including that 12-14 hour flights (the only ones the FAA considered) reflected all flights, and that labor agreements and crew scheduling needs would permit carriers to reduce flight crews from four to three. Id., at 97-101.

As to schedule reliability costs, the FAA assumed carriers would need only 2-3 days to modify their scheduling software to report on scheduling reliability and one day every two months to prepare and submit the reports that would be required by the Proposed Rule, and it assumed costs associated with those estimates. RIA, at 104-05. The FAA failed to acknowledge any differences among carriers in this regard, even though carriers' business models, organizational structures, and number of personnel are very different. The FAA made similar assumptions with regard to the costs of fatigue training and the installation of rest facilities on aircraft. Id., at 106-18.

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[17] A B727 is not a large cargo aircraft.

IX. The FAA Did Not Adequately Consider the Proposed Rule's Impact on NACA's Non-Scheduled Member Carriers as Small Businesses Under the Regulatory Flexibility Act.

The FAA failed to satisfy its obligations under the Regulatory Flexibility Act, 5 U.S.C. §§ 601-612, to adequately consider the impact of the Proposed Rule on small businesses such as NACA's non-scheduled member carriers. Under the Regulatory Flexibility Act ("RFA"), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 ("SBREFA"), the FAA is required to consider the impact of its rulemakings on small entities. An analysis under the RFA is required for both an NPRM and a final rule when the rulemaking could "have a significant impact on a substantial number of small entities." See 75 Fed. Reg. at 55881.

In its initial regulatory flexibility determination and analysis in the NPRM, see 75 Fed. Reg. at 55881-82, the FAA merely concluded that the proposed rule would have a significant impact on a substantial number of small entities – it went no further. The FAA noted that the financial burden of the Proposed Rule could disproportionately fall on small businesses, but it failed to provide any estimate of the impact on small businesses such as NACA's non-scheduled member carriers. Instead, the FAA acknowledged its lack of data and knowledge in this area and requested comments from small businesses (with supporting data) assessing the financial impact.

A. The Proposed Rule Would Have a Disastrous Effect on NACA's Non-Scheduled Member Carriers as Small Businesses.

As to the projected reporting, recordkeeping, and other compliance requirements of the Proposed Rule, the FAA admitted that the rule "would increase reporting and recordkeeping" and stated that "[i]n addition to changes in crew schedules, there would be a minor increase in documenting crew rest." 75 Fed. Reg. at 55881. Here, as explained above, NACA's thirteen non-scheduled member carriers estimate that these administrative costs would add up to $11.45 million in the start-up year alone and $8.243 million in recurring costs each year. These costs would impose a significant burden upon NACA's non-scheduled member carriers to comply with this aspect of the Proposed Rule.

As to the affordability of the Proposed Rule, the FAA stated that it "expects wide variability in cost impacts on small entity operators" because "[t]he sample crew scheduling changes provide only a rough proxy for the impact on pilots' time and availability. Current crew schedules vary by operator, labor contract, and size of pilot pools." 75 Fed. Reg. at 55881. The FAA acknowledged that "many smaller operators have maximized their pilot time in the cockpit and may have little flexibility with potential new flight and duty regulations. Operators needing to hire more pilots would incur the cost of hiring, wages, overhead, and training. Some captains from smaller operators could be lured away by other operators, especially the larger operators with better benefit packages." But the FAA claimed "[t]hat outcome might be mitigated by the recent extension of pilots being able to work to age 65 and the inherent flexibility of the larger carriers." The FAA requested that smaller operators "provide estimated impacts of the proposed changes on their existing crew schedules," noting that it expects those operators will have to hire more pilots, and that the increase in demand for pilots may result in raised pilot wages. 75 Fed. Reg. at 55881.[18]

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[18] NACA's non-scheduled member carriers do not anticipate any noticeable mitigation of these costs from pilots now being permitted to work until age 65 or from the flexibility of larger carriers (two potential sources of mitigation cited by the FAA).

As described above, the Proposed Rule would have a significant financial impact on NACA's non-scheduled member carriers' costs. Those carriers' forecasts indicate that the Proposed Rule will add 8.6% in new costs as a percentage of all carriers' 2009 revenues in the start-up year (2013) and 6.4% in new costs as a percentage of all carriers' 2009 revenues every year thereafter. These projected costs represent a nearly life-threatening burden on non-scheduled carriers represented by NACA.

As to the disproportionality of the Proposed Rule's impact on small business carriers, the FAA admitted that increased rest requirements in the Proposed Rule "could result in the need to hire more pilots," which "would be more difficult to accommodate for operators with small pilot staffs." The FAA further noted that many small airlines "may need a fraction of a new pilot's time to meet requirements. In this case, the airline would need to hire and train an additional pilot or reduce the number of operations. This added pilot would account for a larger percentage of the cost of pilots for the small airline than is likely to be the case for a major airline." 55 Fed. Reg. at 55881-82. Here, as described above, the Proposed Rule would result in substantial costs and negative effects on NACA's non-scheduled member carriers' operations. Contrary to the FAA's assumption in the NPRM, NACA's non-scheduled member carriers would need far more than just one additional pilot or a slight reduction in operations to comply with the Proposed Rule. NACA's non-scheduled member carriers forecast they will need to hire nearly 1,100 pilots to conduct operations under the proposed Part 117:

NATIONAL AIR CARRIER ASSOCIATION
Selected Statistics

Carrier	2009 Revenue ($ millions)	No. of Aircraft	Pilots				No. of Employees
			Base	117	Total	% Increase	
A	$158	19	50	36	86	65%	400
B	200	28	578	104	682	20%	1,220
C	500	11	96	29	125	30%	460
F	700	18	266	72	338	27%	1,000
G	340	6	75	12	87	16%	160
I	644	10	98	39	137	40%	410
J	233	3	50	10	60	20%	90
K	80	10	166	50	216	30%	740
L	980	4	40	16	56	40%	300
M	522	15	298	301	599	101%	1,050
N	220	10	80	56	113	70%	500
O	24	17	348	275	623	79%	540
P	60	21	436	96	532	22%	1,410
TOTAL	$4,661	172	2,581	1,096	3,654	42%	8,280

This represents an overall increase of 42% in pilot employment at the thirteen carriers, a number significantly higher than the 3% increase forecast by the FAA.

As to the Proposed Rule's effect on small business carriers' competitiveness, the FAA admitted that the Proposed Rule's requirements are "likely to worsen [small] entities' relative competitive position," but stated that it "is unable to provide a measure of how much." The FAA noted that some small operators will have little flexibility or ability to pass on increased costs to customers. But the FAA stated that it is uncertain about this impact because it lacks relevant data, and it sought comments on this issue. 55 Fed. Reg. at 55882. Here, NACA's non-scheduled member carriers will face significant competitive hindrances from the Proposed Rule. Unlike large passenger and cargo carriers, NACA's non-scheduled member carriers have little flexibility to pass on any of the increased costs imposed by the Proposed Rule to their customers.[19] This is particularly true for carriers' operations on behalf of the U.S. military given that, as explained above, DOD has proposed a reduction in the blended rate for cargo and passenger operations of up to 10% for Fiscal Year 2011 contracts. Likewise, the Proposed Rule's stringent and unrealistic flight duty and rest requirements for non-scheduled operations will limit NACA's non-scheduled member carriers' ability to continue to fly the same operations on the same schedule and with the same crew staffing. In particular, NACA's non-scheduled members carriers will no longer be able to compete for international commercial charter flights with foreign carriers, which are not subject to the Proposed Rule and therefore likely will be able to under-price NACA's members for such operations.

As to the possibility that the Proposed Rule could put some small carriers out of business, the FAA asserted that "[e]ven if there is a disproportionate impact and a loss in competitive positioning [this] does not mean a firm would have to close because of this proposed rule." 55 Fed. Reg. at 55882. On what basis does the FAA reach this conclusion? As explained above, although the exact economic impact of the Proposed Rule can not be known until it takes effect, some of NACA's non-scheduled member carriers may not be able to fully absorb the significantly increased costs and burdens from the Proposed Rule and could go out of business. The FAA failed to consider the

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[19] The disproportionate impact of the Proposed Rule on NACA's non-scheduled member carriers puts them at risk of losing business to large scheduled carriers bidding for the same business, because large scheduled carriers can better absorb the increased costs of the Proposed Rule.

potentially life-threatening costs the Proposed Rule would impose on NACA's non-scheduled member carriers as small businesses.

B. The FAA Failed to Consider All Reasonable Alternatives to the Proposed Rule.

The FAA also failed to consider all reasonable alternatives in its initial RFA analysis, in violation of its obligations under the RFA. The FAA stated that it considered three alternatives: (1) the Proposed Rule; (2) the Proposed Rule with an extended compliance time; and (3) the Proposed Rule expanded to include Part 135 operators. 55 Fed. Reg. at 55882. None of these are true alternatives, but, even so, the FAA summarily rejected the three alternatives to the Proposed Rule, claiming that "there are no reasonable alternatives to this rulemaking that would lesson the potential impact on a substantial number of small entities." Id.

It is a total puzzle that the FAA completely ignored both alternatives proposed by NACA. NACA initially proposed (as part of the ARC) that the FAA keep Subpart S for non-scheduled carriers, which, as described above, is a reasonable and realistic alternative, supported by current science. NACA also proposed a framework for non-scheduled operations that would accomplish the FAA's safety objectives without overly burdening non-scheduled carriers. The FAA never even acknowledged either of these proposals. NACA has also made a reasonable, realistic proposal herein that is supported by science and provides an equivalent (or better) level of safety for non-scheduled operations.

The FAA's utter failure to identify and consider all reasonable alternatives to the Proposed Rule stands in stark contrast to the admirable, RFA-compliant initial determination of the National Highway Transportation Safety Administration

("NHTSA") and the Environmental Protection Agency ("EPA") in their recent NPRM on heavy-duty greenhouse gas and fuel efficiency standards for large trucks. See Notice of Proposed Rulemaking: Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles (Oct. 25, 2010). In that NPRM, the NHTSA and EPA compiled a list of engine, vehicle, and body manufacturers that would be potentially affected by the proposed rule, and then identified companies that appeared to be small businesses. Based on that assessment, the NHTSA and EPA identified several entities and, given the likely significant impact upon those entities, proposed to exempt them from the standards established under the Proposed Rule.

C. The FAA Should Have Considered All Small Entities, Not Just Part 135 Operators, Together in One Rulemaking Proceeding

The FAA inexplicably failed to consider the alternative of a separate rulemaking proceeding for all small entities, including non-scheduled carriers. The FAA determined that Part 135 operators, due to their status as small entities, should not be subject to the Proposed Rule and, instead, there should be a separate rulemaking to determine appropriate flight time and duty time regulations for those carriers. The FAA stated in the NPRM that it "did consider expanding the rule to include part 135 operators. All or nearly all of these operators are small entities. As the economic impact may be more severe, the agency wants to study the impact on these operators before proposing a rulemaking." 75 Fed. Reg. at 55882. The exact same reasoning applies with equal force to non-scheduled carriers. The FAA's has provided no justification (and there is none) for excluding some, but not all, small entities from the scope of the Proposed Rule and considering some, but not all, of those entities in a separate rulemaking proceeding.

CONCLUSION

For the foregoing reasons, it is clear that: (1) the FAA has failed to consider the unique nature of the operations of non-scheduled carriers; (2) the Proposed Rule will have a disproportionately large, if not disastrous, effect on NACA's non-scheduled member carriers as small businesses; (3) the costs of the Proposed Rule so far outweigh its benefits as to non-scheduled carriers that it cannot be adopted as currently drafted; (4) the FAA's assertion that carriers will be able to pass on increased costs to their customers does not apply to most of NACA's non-scheduled members carriers; and (5) the RIA wholly fails to support the cost-benefit analysis required by law. Accordingly, NACA respectfully requests that the FAA leave the current Subpart S in effect while the FAA conducts a separate rulemaking on appropriate flightcrew member duty and rest requirements for non-scheduled operations.

Dated: November 15, 2010

Respectfully submitted,

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APPENDIX A

to

Comments of National Air Carrier Association

(November 15, 2010)

Docket FAA-2009-1093

NACA's Proposal
for Non-Scheduled Carriers

FEDERAL AVIATION ADMINISTRATION
FLIGHTCREW MEMBER DUTY AND REST REQUIREMENTS

NACA'S PROPOSAL FOR NON-SCHEDULED CARRIERS

A. Summary of NACA's Proposal

NACA's Proposal has the following critical components:

- NACA's Proposal does not impose a single set of identical flightcrew duty and rest requirements on all carriers and addresses, scientifically, the significant differences between scheduled and non-scheduled carriers.
- NACA's Proposal for unaugmented and augmented non-scheduled operations is based on science and provides for the safety of flightcrews and carrier operations while also retaining the flexibility non-scheduled carriers need to continue to operate without unreasonable restrictions.
- NACA's Proposal can be applied to all non-scheduled operations by U.S. carriers worldwide.
- For unaugmented operations, NACA's Proposal sets a 14-hour flight duty period with the possibility of a 2-hour extension no more than twice in a 168-hour period, and never on consecutive days, with 16 hours of rest required if the second extension occurs.
- NACA's Proposal reduces flight duty period limits by two hours, to 12 hours, for any period that encounters the Window of Circadian Low ("WOCL"). For augmented operations with a Class 1 rest facility, NACA sets a flight duty period of 18 hours for a 3-pilot crew and 20 hours for a 4-pilot crew, with these maximums reduced by one hour for a Class 2 rest facility and two hours for a Class 3 rest facility. Because in-flight rest is available, and because science demonstrates that in-flight sleep mitigates

fatigue over significant periods, no reduction of these hours is necessary when they encounter the WOCL.

- At nearly every turn, NACA's Proposal provides more fatigue mitigation than the FAA's Proposed Rule. For example, where the FAA would permit an extension of up to three hours in an augmented flight duty period, NACA permits only two hours. Although NACA's cumulative flight duty period in a 168-hour period exceeds that proposed by the FAA, NACA's built-in fatigue mitigation options ensure that pilots are better-rested throughout the entire flight duty period, and NACA also requires longer post-flight rest periods than the FAA does.
- NACA's Proposal does not contain flight time limits because these are not necessary given science-based flight duty period limits and fatigue-mitigating rest.
- NACA's Proposal may have longer flight duty periods than the FAA's Proposed Rule, but NACA's Proposal also has longer rest periods than the Proposed Rule, thus providing greatly enhanced fatigue mitigation.

B. NACA's Proposal for Unaugmented Operations

For a two-pilot crew in un-augmented operations, NACA recommends a 14-hour flight duty period, as shown in NACA Table B below, where no part of the flight duty period encounters the Window of Circadian Low (0200 – 0600) ("WOCL") at the pilots' home base (as assigned by the certificate holder) or at an acclimated location. When the flight duty period encounters the WOCL, NACA's Proposal decreases the applicable limit by two hours. When a pilot is un-acclimated, NACA's Proposal further decreases the applicable limit by one hour. When more than four segments are operated during a single flight duty period, NACA's Proposal further decreases the applicable limit by one hour for each added mission segment beyond four.

NACA’s Proposal permits an extension of up to two hours for unforeseen operational circumstances and up to two extensions in a single 168-hour look-back period. If the second extension is required in 168 hours, NACA’s Proposal requires 16 hours of rest prior to the pilot’s next flight duty period.

NACA’s Proposal for acclimated crews sets a minimum rest period of 10 hours from crew release to show time to assure an 8-hour sleep opportunity. This proposal ensures a sleep opportunity of 8 hours for each flight duty period, which is scientifically supported as the average amount of sleep a person needs to avoid sleep deprivation and avoid a cumulative sleep deficit. See, e.g., Statements of Drs. Belenky & Hursh, Aviation Rulemaking Committee Meeting (July 21-23, 2009). This ten-hour rest period is two hours more than currently required by the FAA, see 14 C.F.R. Part 121, Subpart S, and is equivalent to the amount in the Proposed Rule. See 75 Fed. Reg. at 55873 (proposing a minimum of 9 hours of pre-flight duty period rest, beginning only once the flightcrew member reaches a suitable accommodation). NACA’s Proposal also requires at least one 30-hour rest period in any 168-hour look-back period, calculated from the time when a crewmember reports for his or her flight duty period.

The table shown here as Table B is intended to replace the FAA’s proposed Table B in the NPRM. See 75 Fed. Reg. at 55888-89.

NACA's Proposal
TABLE B TO PART 117
FLIGHT DUTY PERIOD: UNAUGMENTED OPERATIONS

	Acclimated Segments					
Time of start	**1 - 4**	**5**	**6**	**7+**	**Extensions**[1]	**Hours Decreased If Not Acclimated**
0000-0559	12	11	10	9	+2	-1
0600-1159	14	13	12	11	+2	-1
1200-1259	13	12	11	10	+2	-1
1300-2359	12	11	10	9	+2	-1

C. NACA's Proposal for Augmented Operations

NACA's Proposal for augmented operations extends the flight duty period limits in its proposal for unaugmented operations by four to six hours, depending on the number of pilots used and the type of rest facilities available onboard the aircraft. As with its proposal for unaugmented operations, NACA's Proposal permits an extension of up to two hours for unforeseen operational circumstances and no more than two extensions in a single 168-hour look-back period. If two extensions are required in two flight duty periods within a single 168-hour period, NACA's Proposal requires 16 hours of rest prior to the pilot's next flight duty period. Under this proposal, applicable flight duty period limits are decreased by one hour when the flightcrew member is unacclimated – a reduction of 30 minutes more than the FAA proposes. Because in-flight rest is provided through onboard rest facilities, NACA's Proposal for augmented operations does not decrease a flightcrew member's flight duty period limits when the pilot flies during the WOCL.

NACA's Proposal for acclimated crews sets a minimum rest period of 10 hours from crew release to show time to assure not less than 8 hours of sleep opportunity. For unacclimated

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[1] Should two extensions be required within one 168-hour period, a 16-hour rest period must be provided prior to the pilot's next flight duty period.

crews, NACA proposes a minimum rest period of 12 hours from crew release to show time further mitigate fatigue and assure the 8 hours of sleep opportunity. NACA believes that more rest at unacclimated locations than proposed by the FAA will better mitigate fatigue in non-scheduled operations, and therefore it proposes a 12-hour minimum for such rest.[2] As explained above, these proposed minimum rest periods exceed the FAA's current requirements and ensure a sleep opportunity of more than 8 hours for each flight duty period, the scientifically supported amount.

The table shown here as Table C is intended to replace the FAA's proposed Table C in the NPRM. See 75 Fed. Reg. at 55889.

NACA Proposed
TABLE C TO PART 117
FLIGHT DUTY PERIOD: AUGMENTED OPERATIONS

Acclimated	**Class1**	**Class 1**	**Class 2**	**Class 2**	**Class 3**[3]	**Class 3**
Time of Start	**3 Pilots**	**4 pilots**	**3 Pilots**	**4 pilots**	**3 Pilots**	**4 pilots**
0000-2359	**18**	**20**	**17**	**19**	**16**	**18**
Extension	**+2**	**+2**	**+2**	**+2**	**+2**	**+2**
Non-Acclimated	**-1**	**-1**	**-1**	**-1**	**-1**	**-1**

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[2] NACA does not agree with the FAA that three physiological nights of rest is necessary upon a flightcrew member's return to his or her home base because, under NACA's Proposal, fatigue has been mitigated through the crew member's prior flying experience, which include longer rest periods at non-acclimated locations. Thus, there is no need to require a different level of rest when a crew member returns home.

[3] As discussed in **Appendix B**, NACA believes that Class 3 rest facilities should include common coach-class seats and non-crew seats on the flight deck of all cargo aircraft. The flight duty period limits in NACA's Proposed Table C assume that such seats would count as Class 3 rest facilities.

D. NACA’s Proposal Is More Stringent Than Current Subpart S.

NACA’s Proposal is more stringent than current Subpart S:

N = Not Specified

	Flight Duty Period (hrs)		Rest Hours		Flight Time	
	121 - Sub. S	NACA	121-Sub. S	NACA[1]	121-Sub. S	NACA
2 pilots	16	14 Max; Only 12 if WOCL Encounter	2XFlt; not<8 If fly >8in24, 16 rest	10 12 if not Acclimated	8 Scheduled	N Pre-flight & Ground Stops Limit Flight Time
2 Pilots + 1 Flt Eng	N	16 Max; Only 14 if WOCL Encounter	N if fly>20in48 or >24in72 18 rest	10 12 if not Acclimated	12	N Ground Stops Limit Flight Time
3 Pilots	18 no in-flight rest facility Required	18 - Class 1 17 - Class 2 16 - Class 3	N if fly>20in48 or >24in72 18 rest	10 12 if not Acclimated	12	N Ground Stops Limit Flight Time
4 Pilots	30	20 - Class 1 19 - Class 2 18 - Class 3	N	10; 12 if not Acclimated	16	N Stops Limit Flt Time

Note 1: If flight duty periods are extended twice in 168 hours, 16 hours rest required.

Max. Flight hrs/Rest hrs in period shown

	121-Sub. S	NACA
Pilots	2/3/4	All
30 Days	100/120/N	N
90 Days	N/300/350	N
12 Months	All 1,000	N
Rest-168 hrs	24	30

E. NACA’s Proposal Provides a Workable Solution for the Use of Reserve Crews in Non-Scheduled Operations.

NACA’s Proposal also provides a workable solution for the use of reserve crews in non-scheduled operations. The availability of reserve crews is one of the most significant problems in the Proposed Rule for non-scheduled operations. As written, the Proposed Rule will cripple worldwide non-scheduled air transportation that must, in most cases, be operated with augmented crews or with only one reserve crew available because there are no crew bases structured along the flight route. In most cases, a reserve crew will have deadheaded to a rest location where a technical stop is planned for crew changes. If the flight is delayed, the reserve crew members must be kept in the suitable accommodation until called out.

NACA recommends a basic short-call reserve time limit of 16 hours on/8 hours off format so that, if the crew member is called out in the first 6 hours, the maximum flight duty period listed in Table B or C, above, can be operated. When a crew member is called out after the first 6 hours of his or her reserve duty, then the maximum short call reserve time and subsequent FDP cannot exceed 16 hours. If any part of short call reserve fell during the crew member’s WOCL, the full period of the WOCL should be considered rest, and a full flight duty period should be permitted if the flightcrew member is called within six hours after the uninterrupted WOCL rest. This scheme is necessary to permit long-haul non-scheduled operations to continue and can be accommodated within the NACA Proposal as presented.

F. NACA’s Proposal Is Supported by Science and Provides a Level of Safety That Is Equivalent to the FAA’s Proposed Rule.

NACA’s Proposal is supported by science and would provide an equivalent or better level of safety to the Proposed Rule. NACA’s Proposal addresses all of the sources of fatigue discussed by the FAA in the NPRM: time of day (WOCL), amount of recent sleep, time awake, cumulative sleep debt, and time off task. See 75 Fed. Reg. at 55855. NACA agrees with this list of the sources of fatigue, and NACA's Proposal provides logical, science-supported solutions for fatigue mitigation. In nearly all cases, NACA's Proposal requires longer rest periods than the FAA's Proposed Rule and therefore provides an equivalent or better level of safety than the Proposed Rule.

It is undisputed that sleep is the principal mitigation for fatigue, a fact that was discussed at length at the ARC's meetings. As observed by Dr. Belenky, "[e]ight hours of sleep a night sustains performance indefinitely." See Appendix F, Bibliography of Scientific Sources, No. 17, at 255. "[S]cientific research and experimentation has consistently demonstrated that adequate sleep sustains performance. For most people, 8 hours of sleep in each 24-hour period sustains performance indefinitely." Id., at 26. Moreover, scientific studies have shown that, within limits, shortened periods of nighttime sleep augmented by additional sleep periods such as in-flight sleep or split duty rest may be nearly as beneficial as a single consolidated sleep period. Id., at 260. In addition, as discussed at ARC meetings, recovery sleep does not require additional sleep equal to one's cumulative sleep debt. Thus, a person with an eight-hour cumulative sleep debt does not need eight additional hours of sleep in order to fully recover from fatigue, but sleep opportunities on recovery days should be extended beyond the usual sleep amount. Id., at 27.

1. NACA's Proposal Addresses All Fatigue Mitigation Issues.

NACA's Proposal ensures an equivalent level of safety to the Proposed Rule by mitigating fatigue in several different ways.

a. NACA's Proposal Requires Longer Rest Periods.

First, NACA's Proposal requires that flightcrew members have rest periods that are longer than both the FAA's current regulations and the FAA's Proposed Rule. Current regulations require only 8 hours of rest, and the Proposed Rule would require 9 hours of rest. NACA's Proposal goes further: it requires a rest period of 10 hours from crew release to show time to assure not less than 8 hours of sleep opportunity for acclimated crews and 12 hours from crew release to show time to assure fatigue is further mitigated for unacclimated crews. Thus, NACA's Proposal ensures a sleep opportunity of more than 8 hours for each flight duty period. NACA believes that additional hours of rest during augmented operations at un-acclimated locations will further mitigate the effects of any cumulative fatigue and will provide extended rest opportunities to achieve recovery sleep that may be lost due to non-acclimatization.

NACA's Proposal also decreases applicable flight duty period limits for augmented operations by one hour when the flightcrew member is unacclimated – which decreases the applicable limit by 30 minutes more than the FAA's Proposed Rule. This extra rest for unacclimated crew members further mitigates fatigue from augmented operations and ensures that crew members are well-rested.

Additionally, NACA's Proposal limits flight duty periods to 14 hours *unless* the flight duty period encounters the WOCL hours of 0200-0600. If a flight duty period encounters the WOCL at all, then NACA's Proposal requires a 2 hour reduction, to a maximum of 12 hours.

NACA's Proposal includes further fatigue mitigation through cumulative look-back periods by requiring a 16-hour rest period if a flightcrew member's flight duty periods are extended beyond the maximum limits more than once in a 168-hour period. This look-back period ensures that flightcrew members have additional opportunities to reduce any cumulative sleep deficits developed during recent flight duty periods.

NACA's Proposal also takes an even more conservative approach than the Proposed Rule for flying more than four segments. Whereas the FAA proposes to reduce each flight duty period limit when flying more than four segments by 30 minutes, NACA proposes to reduce each flight duty period limit flown over four segments by one hour – 30 minutes longer than what the FAA proposes to require. NACA's approach reflects its overall effort to provide more fatigue mitigation as operations become more difficult.

b. NACA's Proposal Mitigates Fatigue in Augmented Operations Through In-Flight Sleep and Split Duty Rest.

Second, NACA's Proposal takes advantage of the benefits of in-flight sleep and split duty rest for augmented crews to mitigate fatigue. As noted by Dr. Belenky, "[a]ll other factors being equal, if the total amount of actual sleep is the same, split sleep is as valuable as continuous sleep." See Appx. F, No. 17, at 260. Several recent studies have demonstrated that the length of performance benefits from in-flight sleep and split duty rest is longer than previously expected. For example, one study showed that sleep lasting 20-30 minutes improved cognitive performance for as long as 155 minutes thereafter, and that sleep lasting just 10 minutes improved cognitive performance for 95 minutes thereafter. Id., No. 6. An analysis of 12 other studies confirmed these results, showing that a 15-minute period of sleep led to a 2-hour benefit thereafter and a 4-hour period of sleep led to as much as a 10-hour benefit. Id., No. 16.

These sleep studies are important in NACA's Proposal, particularly as to its proposed rest periods, split duty, three-person crew cockpit flight duty periods, and fatigue mitigation in augmented operations. In the ARC discussions, Dr. Hursh stated that his models value sleep in a bunk at approximately 66-80 percent of normal sleep and sleep in a coach seat at approximately 50 percent of normal sleep. Id., No. 17, at 260. NACA's proposed flight duty period limits grant approximately those percentages of credit. In addition, as noted above, NACA's Proposal extends rest opportunities for un-acclimated pilots. This is done to allow extra time for sleep where acclimatization issues may preclude an 8-hour sleep experience. The science on the benefit of in-flight sleep also supports NACA's proposed 16-hour required rest period after a second extended flight duty period within a single 168-hour period. NACA's Proposal includes longer flight duty periods for augmented crews because flightcrew members in augmented crews can take advantage of in-flight sleep. The goal of NACA's Proposal is to ensure that flightcrew members have sufficient sleep to mitigate their fatigue.

c. NACA's Proposal Accounts for Flying During the WOCL.

Third, NACA's Proposal accounts for the particular fatigue issues associated with flying during the WOCL. As the FAA explained in the RIA, higher-than-projected accidents rates occur during the hours between midnight and 0600. To address the higher accident rate at night, the FAA proposes a complex, CAP-371-like table of maximum flight duty periods based upon the hour of the day when the first duty hour occurs and the number of flight segments. This table is clearly designed for scheduled service operations, as the overwhelming majority of scheduled service passengers do not fly between the hours of 2200 and 0600. A NACA search of online reservations at websites for the five largest U.S. scheduled carriers over numerous domestic city-pairs confirmed that fact. NACA's Proposal, on the other hand, accounts for the significant issue of time-of-day in human performance while still setting forth realistic, workable limits for non-scheduled operations by making significant reductions in maximum flight duty periods for flying at night. As detailed above, NACA's Proposal limits flight duty periods to 14 hours *unless* the flight duty period encounters the WOCL hours of 0200-0600. If a flight duty period encounters the WOCL at all, then NACA's Proposal requires a 2 hour reduction, to a maximum of 12 hours.

NACA's proposed reduction in flight duty period limits when flying during the WOCL is involved reflects the current science on the effect of light and flights during the early-morning hours. In some flight duty periods that encounter the WOCL, a pilot is reporting for duty during daylight hours. NACA's Proposal therefore recognizes the significant impact that light has on operational performance and circadian rhythms by decreasing the applicable flight duty period limit by 2 hours.

d. NACA's Proposal Adequately Limits Multiple-Segment Flying.

Fourth, NACA's Proposal follows the FAA's approach in reducing flight duty period limits based upon flight segments. Both NACA and the FAA propose core flight duty period limits for up to four segments. This is supported by science: Dr. Hursh observed, during the ARC's discussions, that "flying four sectors is not much more than flying two sectors, but additional limits would be needed for flying six or seven sectors." He therefore recommended "using ranges for the number of sectors instead of a single column for each sector: 1 to 3 or 6 to 9." Appx. F, No. 17, at 264. Based on this science, the FAA proposed to reduce each flight duty period limit by 30 minutes when flying more than four segments. NACA takes an even more conservative approach than the FAA's proposal, proposing to reduce each flight duty period limit by **one hour**. This greater reduction offsets the longer flight duty period limits for certain duty periods in NACA's Proposal. This reduction reflects NACA's safety-based scientific approach of introducing more fatigue mitigation options as operations become more difficult, thereby providing an equivalent or better level of safety.

2. NACA's Proposal Adequately Addresses Fatigue Issues From Past Accidents.

NACA's Proposal also adequately considers accident data to mitigate fatigue as well as, if not better than, the FAA's Proposed Rule. To support its flight duty period limits, the FAA evaluated 43 accidents between 1990 and 2009 for which human fatigue factors were a cause and determined that nearly all accidents occurred during the first 14 hours of flight duty time. See RIA, at 18, 21. As a result of this analysis, the FAA proposed flight duty period limits of 13 hours for unaugmented operations. See id., Table 2, at 23. Similarly, NACA's Proposal sets forth a maximum flight duty period of 14 hours, which also falls within the same accident risk block in Table 1 (13-14 hours) that the FAA used.[4] Thus, to the extent that this accident risk data supports the FAA's proposed flight duty period limits, it equally supports NACA's proposed flight duty period limits. No greater risk is assumed at 14 hours of flight duty time.

NACA's one additional hour of flight duty time in its proposal is justified based on the unique nature of non-scheduled operations. In the FAA's analysis, the first hour of flight duty periods had no accident risk because that time consists of pre-flight activities. In non-scheduled operations, however, pre-flight activities last approximately two hours – one hour longer than what the FAA assumed – due to the fact that there are no permanent support options for pre-departure servicing. As the FAA recognized, there is no accident risk during pre-flight activities because no flying is taking place. For non-scheduled operations, therefore, NACA's one additional hour of flight duty time in its proposal is offset by one additional hour of pre-flight activities that is not considered in the FAA's Proposed Rule. Thus, NACA's proposed flight duty period limit of 14 hours for unaugmented crews creates no greater accident risk than the FAA's 13-hour proposal, and therefore provides an equivalent level of safety as the Proposed Rule.

NACA's proposed flight duty and rest period requirements are further supported by the accident data analyzed by the FAA. From January 1, 1999 to January 1, 2009, there was only one fatigue-related accident in non-scheduled operations: FedEx at Tallahassee, Florida (TLH) in 2002 (NTSB: DCA02MA054). There were no fatalities and flightcrew members had the

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[4] NACA notes that the real accident risk, as shown in Table 1, is during flying between the second and eighth hours of flightcrew members' flight duty periods, not during flying from the 9th hour onward. See RIA, Table 1, at 21.

required pre-flight rest opportunities under the current regulations. In fact, an analysis of the facts underlying this accident reveals that the pilot at issue reported for duty in a state of fatigue despite scheduled rest periods equal to or greater than the amount of rest proposed by the FAA or NACA here. As the FAA pointed out in analyzing this accident in the RIA, the pilot's fatigue was not related to scheduling issues and would not have been mitigated by the prescriptive flight duty periods in the FAA proposal. The pilot's fatigue also would not have been mitigated by the NACA proposal. Rather, NACA believes that the issues related to this pilot's fatigue would be best mitigated through better fatigue training and pilot discipline under a carrier's Fatigue Risk Management Plan. In particular, through the fatigue survey and analysis required in Fatigue Risk Management Plans, NACA is confident that pilots will more readily declare their fatigue status, allowing operations to be changed to better manage fatigue mitigation opportunities. At a minimum, because there were no fatalities in this accident, no lives would have been saved if the FAA's Proposed Rule had applied.

3. **There Have Been No Fatigue-Related Accidents From Non-Scheduled Carriers' Augmented Operations, and Therefore Subpart S Is Sufficient.**

NACA has also analyzed all 43 of the accidents discussed in the RIA. Notably, NACA was unable to find any accidents reported from augmented operations. Thus, the accident history analyzed by the FAA proves that the fatigue mitigation opportunities that are already present in Subpart S for augmented operations are sufficient. Although NACA acknowledges that there have been accidents in unaugmented operations, NACA is confident that its proposal addresses all of the scheduled flight duty period and rest period requirements specific to the 43 accidents discussed in the RIA. NACA's Proposal therefore provides an equivalent level of safety to the FAA's Proposed Rule.

In sum, NACA's Proposal provides significant fatigue mitigation that, in nearly all cases, is more stringent than the Proposed Rule. These increased rest requirements, together with flight duty period limits that reflect the unique nature of non-scheduled operations, demonstrate that NACA's Proposal would provide at least an equivalent level of safety to the Proposed Rule.

G. Flight Time Limits Are Not Necessary.

The discussion of flight and duty regulatory change for the past two decades has focused on the transition from regulations based upon flight time limits to science-based regulations of flight duty periods. NACA agrees with the concept of science-based, fatigue mitigated, flight duty periods and the provision of fatigue mitigating rest. Restrictions on flight duty periods, which include ground time for pre- and post-flight duties and the turn times involved with multiple mission segments, will concurrently provide reasonable limits to actual flight time. As noted by Dr. Hursh in the ARC discussions, duty time – not flight time – is what limits pilots' opportunity to sleep. Similarly, Dr. Belenky has noted that "duty time limitations are a stronger predictor of sleep and rest opportunities than flight time limitations." Appx. F, No. 17, at 258. And, notably, relevant international standards do not contain flight time limits, as neither CAP 371 nor EASA Subpart Q contains daily flight limits. Adding another layer of limitations for flight time will not provide additional safety; such limits will merely prevent pilots from flying as much, thereby reducing their proficiency and, as a result, their safety, as well as their productivity, international competitive posture, and pay.[5]

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[5] If the FAA insists upon a flight time limit, NACA proposes that flight time be limited to one hour less than the applicable flight duty period limit, which will account for some time during a flight duty period spent by a flightcrew member before or after flying.

APPENDIX B

to

Comments of National Air Carrier Association
(November 15, 2010)

Docket FAA-2009-1093

Comments on Proposed Part 117

NACA's Comments on NPRM Section 117

NACA's comments on the FAA's proposed new 14 C.F.R. Part 117 are placed within the context of the proposal below.

PART 117--FLIGHT AND DUTY LIMITATIONS AND REST REQUIREMENTS: FLIGHTCREW MEMBERS

Sec.

Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701-44702, 44705, 44709-44711, 44713, 44716-44717, 44722, 46901, 44903-44904, 44912, 46105.

Sec. 117.1 Applicability.

This part prescribes flight and duty limitations and rest requirements for all flightcrew members and certificate holders conducting operations under part 121 of this chapter. This part also applies to all flightcrew members and part 121 certificate holders when conducting flights ***directed by the certificate holder*** under part 91 of this chapter.

NACA Comment: The FAA's preamble, Federal Register (FR), vol. 75, No. 177, p.55857, makes it clear that this part applies to "all flights conducted by part 121 certificate holders," and the FAA's answers to clarifying questions filed in the docket as Document FAA-2009-1093-0365 highlights this point. However, the docket is rarely available to pilots and certificate holder personnel, and the language in this section does not make clear that the reference to Part 91 flights is to only those flown under the direction of the Part 121 certificate holder (i.e., ferry flights with no commerce on board, maintenance proving flights).

NACA Recommendation: Change the second sentence as shown above or in a similar manner.

Sec. 117.3 Definitions.

In addition to the definitions in Sec. 1.1 and 119.3 of this chapter, the following definitions apply to this part. In the event there is a conflict in definitions, the definitions in this part control.

Acclimated means a condition in which a crewmember has been in a theater for 72 hours or has been given at least ***30*** ~~36~~ consecutive hours free from duty.

NACA Comment: NACA believes it is important in regulations controlling both schedules and operations that the extended rest periods be consistent across domestic and international operations. NACA's Proposal includes other mitigations for non-acclimation, including significantly reduced flight duty periods ("FDPs"). NACA recommends that the acclimation time be changed to reflect the FAA's proposed 168-hour look-back rest period of 30 hours (*see* § 117-25.b). Also, as the FAA noted in the preamble of the NPRM (75 Fed. Reg. 55861), while scientists consulted by the Aviation Rulemaking Committee ("ARC") predicted acclimation at approximately one hour per day per time zone, experienced pilots in the session stated it occurred much more rapidly. The ARC's discussion therefore focused on a range of 30-36 hours to acclimate. NACA believes that 30 hours is appropriate. NACA also notes that any further time to acclimate may preclude crewmembers from returning to their home base as crewmembers, which is especially important in all commercial operations where flight hours are guaranteed.

NACA Recommendation: Make the change to hours as shown and add the recommended clarification as presented above.

Airport/**standby reserve** means a defined duty period during which a crewmember is required by a certificate holder to be at, or in close proximity to, an airport for a possible assignment, ***and to show at the departure gate or aircraft within one hour.***

NACA Comment: This definition does not adequately distinguish between airport/standby reserve and short-call reserve. While NACA does not object to defining airport/standby reserve in this rule, it is unnecessary to do so because it is an assignment within a "flight duty period." In non-scheduled operations, long-call and short-call reserve are often served "in close proximity to an airport of possible assignment." As the FAA has defined them herein, long-call reserve is not "duty"; short-call reserve is duty (*see* NACA objection below) but is not part of a flight duty period ("FDP") until the call out; and airport/standby reserve is part of a FDP. In long-call reserve, a full "rest period" must be given at the time of an assignment involving flight. In short-call reserve, the crewmember must be at a "suitable accommodation." In airport/standby reserve, the crewmember is in a FDP with known limits and may or may not be at a suitable accommodation. The rationale for assigning one or the other of these reserves depends upon how soon after notification the certificate holder expects the crewmember to show up at the terminal or aircraft. If the FAA intends to keep this term in the regulation, NACA recommends the FAA expand this definition in terms of the response time, as shown above, to distinguish it from short-call reserve. NACA does not concur that with FAA's answer to clarifying questions in Document FAA-2009-1093-0365 at page 16 that infers that short-call reserve could not be served in a suitable accommodation within "close proximity" to the airport. *See* NACA comments on "Short-call reserve," below.

NACA Recommendation: Rewrite this definition as shown above.

Augmented flightcrew means a flightcrew that has more than the minimum number of flightcrew members required by the airplane type certificate to operate the aircraft to allow a flightcrew member to be replaced by another qualified flightcrew member for in-flight rest.

Calendar day means a 24-hour period from 0000 through 2359.

Certificate holder means a person who holds or is required to hold an air carrier certificate or operating certificate issued under part 119 of this chapter.

Crew pairing means a flight duty period or series of flight duty periods assigned to a flightcrew member which originate or terminate at the flight crewmember's home base.

Deadhead transportation means transportation of a crewmember as a passenger, by air or surface transportation, as required by a certificate holder, excluding transportation to or from a suitable accommodation.

Duty means any task, other than long-call and short-call reserve, that ~~a crewmember performs on behalf of~~ ***is directed by*** the certificate holder, including but not limited to airport/standby reserve, flight duty, pre- and post-flight duties, ~~administrative work,~~ training, deadhead transportation, aircraft positioning on the ground, aircraft loading, and aircraft servicing.

NACA Comment: To remove any argument about whether activities of a crewmember are "on behalf of" the certificate holder, NACA recommends the sentence construction shown in the changes above. If directed by the certificate holder, clearly it is duty. See comments on short-call reserve below. The changes above also make the inclusion of the vague term "administrative work" unnecessary. "Administrative work" is too vague and inclusive of issues that have nothing to do with direction by the certificate holder or FDP fatigue mitigation. With the NACA changes above to indicate that "duty" is a task that is directed by the certificate holder, the other examples given are illustrative enough.

NACA Recommendation: NACA recommends that the definition be rewritten as shown above.

Duty period means a period that begins when a certificate holder requires a crewmember to report for duty and ends when that crew member is free from all duties.

Fatigue means a physiological state of reduced mental or physical performance capability resulting from lack of sleep or increased physical activity that can reduce a crewmember's alertness and ability to safely operate an aircraft or perform safety-related duties.

Fatigue risk management system (FRMS) means a management system for an operator to use to mitigate the effects of fatigue in its particular operations. It is a data-driven process and a systematic method used to continuously monitor and manage safety risks associated with fatigue-related error.

Fit for duty means physiologically and mentally prepared and capable of performing assigned duties in flight with the highest degree of safety.

Flight duty period (FDP) means a period that begins when a flightcrew member is required to report for duty with the intention of conducting a flight, a series of flights, or positioning or ferrying flights, and ends when the aircraft is parked after the last flight and there is no intention for further aircraft movement by the same flightcrew member. A flight duty period includes, ***but is not limited to,*** deadhead transportation before a flight segment without an intervening required rest period, training conducted in an aircraft, flight simulator or flight training device, and airport/standby reserve ***whenever these duties are performed in conjunction with duties involving flight without an intervening rest period.***

NACA Comment: NACA does not agree with the FAA's response to clarifying questions that states that "All training conducted on a flight simulator or flight training device would be considered part of an FDP regardless of when it occurs." *See* Document FAA-2009-1093-0365, at 3. A "flight duty period" must involve a flight or, as a minimum, movement of an aircraft where the public is at risk where an aircraft accident potential immediately exists. Training in a simulator or flight training device has no inherent safety risk. NACA agrees that an assignment of flight simulator training and training in a flight training device should count as duty time. The requirement at § 117.25 that a minimum of nine hours of rest be scheduled prior to reporting for a FDP and the added requirement that a crewmember have 30 hours free of duty in the 168 hour period prior to reporting for a flight duty period mitigate any fatigue accumulated in any ground duty. Furthermore, the cumulative limits for duty provide added fatigue mitigation.

As to cumulative limits, where a FDP and/or airport/standby reserve are scheduled and no actual flight occurs, neither can be included in the FDP cumulative limits of § 117.23. NACA agrees that those hours count towards cumulative "duty" limits.

NACA Recommendation: Make the changes noted above.

Home base means the location designated by a certificate holder where a crew member normally begins and ends his or her duty periods.

Lineholder means a flightcrew member who has a flight schedule and is not acting as a reserve flightcrew member.

Long-call reserve means a reserve period in which a crewmember receives a required rest period following notification by the certificate holder to report for duty.

Night means the period between 0100 and 0700 at the crewmember's designated home base or acclimated location.

NACA Comment: The term "night" is used several times in the Proposed Rule. NACA believes the FAA's intent for its use should be defined. If not, then the FAA should always use the term "physiological night" in all text in the preamble and in the final rule. This would make the term compatible with "physiological night's rest" as defined below.

NACA Recommendation: Add a definition of night as shown above.

Physiological night's rest means the rest that encompasses the hours of 0100 and 0700 at the crewmember's home base, unless the individual has acclimated to a different theater. If the crewmember has acclimated, the rest must encompass the hours of 0100 and 0700 at the acclimated location.

Report time means the time that the certificate holder requires a crewmember to report for a duty period.

Reserve availability period means a ~~***duty***~~ period ***of time*** during which a certificate holder requires a reserve crewmember on short call reserve to be available to receive an assignment for a flight duty period.

NACA Comment: NACA does not concur that short call reserve is duty. ARC discussions were clear that short call reserve, which is a period of time when the only responsibility the crew member has is to answer the phone, is not a fatiguing event and should not constitute duty for cumulative duty purposes. NACA does limit the period of time the crewmember has to respond to the call, and further limits any flight duty period assignment that results from the call. See comments on part 117.21 below.

Reserve duty period means the time from the beginning of the reserve availability period to the end of an assigned flight duty period, and is applicable only to short call reserve.

Reserve flightcrew member means a flightcrew member who a certificate holder requires to be available to receive an assignment for duty.

Rest facility means a bunk, seat, room, or other accommodation that provides a crewmember with a sleep opportunity.

(1) Class 1 rest facility means a bunk or other surface that allows for a flat sleeping position, is located separate from both the flight deck and passenger cabin, ***for passenger aircraft,*** in an area that is temperature-controlled, allows the crewmember to control light, and ***provides reasonable separation from potential*** ~~***isolation from***~~ noise and disturbance.

(2) Class 2 rest facility means a seat in ***a passenger*** aircraft cabin ***or cargo aircraft flight deck*** that allows for a flat or near flat sleeping position, is separated from passengers by a minimum of a curtain to provide darkness and some sound mitigation, and is reasonably free from disturbance by passengers or crewmembers.

(3) Class 3 rest facility means ~~a seat in an aircraft cabin or flight deck that reclines at least 40 degrees and provides leg and foot support.~~ ***any seat in the passenger cabin or any seat in an all-cargo aircraft that is not a required crew seat and that does not meet the standards for Class I and Class II rest facilities above.***

NACA Comment: The FAA appears to apply these definitions to passenger aircraft only. Cargo aircraft often have rest facilities that include horizontal sleep opportunities or other seats with significant recline capability that are suitable for Class 1, Class 2 or Class 3 rest facilities. They are often on the flight deck, but relatively free of disturbance from other crewmembers. While that concept is applicable to all three class definitions, the emphasis on "passenger aircraft" in NACA's proposed changes to the definition of Class 1 and Class 2 rest facilities above does not need to be applied in NACA's proposed change to the definition of a Class 3 rest facility above. Also, the definition of a Class 1 rest facility needs to be further revised as it is impossible to "isolate" a rest area entirely, even with the specifications set forth in Advisory Circular AC-120-31A. NACA does not agree with the FAA's proposed definition of a Class 3 rest facility. The Class 3 definition must include a common coach class seat or non-crew seat on the flight deck of an all-cargo aircraft because rest in a coach seat provides valuable fatigue mitigation, as noted in the record of ARC discussions on science that are included in the docket. "Dr. Hursh stated that his models value sleep on a bunk at approximately 66 to 80 percent of normal sleep, and values sleep in a coach seat at approximately 50 percent of the value of normal sleep." *See* Appendix F, Bibliography of Sources, No. 17, p.260. Numerous other scientific studies support this position, including the FAA's own research with NASA that found that even those rest periods employing a cockpit seat "*are more accurately described as* ***planned sleep opportunities.***" *Id.*, No. 26, p.2 (emphasis added). Since then more recent scientific studies supports even more credit for rest opportunities in flight. *Id.*, Nos. 4, 6, 14-16. *See* NACA comments on § 117.19, below.

NACA Recommendation: Change the introductory sentence and the definitions of Class 1 and Class 2 rest facilities as shown above to accommodate all-cargo aircraft flight deck rest capabilities, and redefine the definition of a Class 3 rest facility as shown above. NACA acknowledges the FAA answer to clarifying questions that a "rest facility" includes both in-flight and ground rest facilities.

Rest period means a continuous period determined prospectively during which the crewmember is free from all restraint by the certificate holder, including freedom from present responsibility for work should the occasion arise.

Scheduled means times assigned by a certificate holder when a crewmember is required to report for duty.

Schedule reliability means the accuracy of the length of a scheduled flight duty period as compared to the actual flight duty period.

Short-call reserve means a period of time in which a crewmember does not receive a required rest period following notification by the certificate holder to report for a flight duty period. ***Short-call reserve is not duty.***

NACA Comment: NACA notes that the FAA has not defined short-call reserve as duty. NACA concurs it is a period of time, but it is not duty. The only task assigned in that time is to answer the phone, and the crewmember is free to conduct his/her life just as a crewmember is in a rest period. NACA proposes the minor change above to specify that short-call reserve is not duty and to distinguish it from airport/standby reserve which falls within a FDP.

NACA Recommendation: Make the changes noted above.

Split duty means a flight duty period that has ***an actual*** ~~scheduled~~ break in duty that is less than a required rest period.

NACA Comment: NACA proposes the minor change above to make clear that the term "scheduled" is used only where it is clearly applicable to the situation intended. This may not mean the initial bid package in non-scheduled operations, as the FAA states in its answer to clarifying questions in Document FAA-2009-1093-0365. When does a "schedule" begin in non-scheduled operations? NACA's position is that it begins when the crewmember shows up for a FDP. However, a break may occur in a FDP for non-scheduled operations that was not foreseen before the event occurs. Additionally, a split duty may be intended in a non-scheduled FDP at the time the crewmember shows up for the FDP, but not used for real-time operational reasons. The fatigue mitigating rest must be provided in the FDP where the time actually occurs. The FDP extension can only be used if the split duty rest opportunity is actually provided.

NACA Recommendation: Make the changes noted above.

Suitable accommodation means a temperature-controlled facility with sound mitigation that provides a crewmember with the ability to sleep in a bed and to control light.

NACA Comment: NACA notes that “suitable accommodation” should not be applied to a “rest facility” used for in-flight augmentation or on the ground for fatigue mitigation within a FDP. NACA acknowledges the FAA’s clarification of this issue in its answer to clarifying questions in Document FAA-2009-1093-0365.

Theater means a geographical area where local time at the crewmember's flight duty period departure point and arrival point differ by no more than 4 hours.

Unforeseen operational circumstance means an unplanned event beyond the control of a certificate holder of insufficient duration to allow for adjustments to schedules, including, ***but not limited to,*** un-forecast weather, equipment malfunction, or air traffic delay***, charter customers’ failure to present passengers and/or cargo at the scheduled time and place; and ground service providers that fail to provide services at the scheduled time.***

NACA Comment: The FAA’s proposed definition does not include the major unforeseen operational circumstances in non-scheduled service: the customer, who determines departure and arrival airport and the departure time, and the ground service providers, who give no priority to *ad hoc* or non-scheduled operations with low frequency, even though service contracts are assured before aircraft arrival. This definition also does not include other operational irregularities such as Minimum Equipment List issues.

NACA Recommendation: Revise the definition to add important non-scheduled unforeseen operational circumstances that are beyond the control of the certificate holder, as shown above.

Window of circadian low means a period of maximum sleepiness that occurs between 0200 and 0559 during a physiological night.

Sec. 117.5 Fitness for duty.

(a) Each flightcrew member must report for any flight duty period rested and prepared to perform his or her assigned duties ***up to the prescribed flight duty period limits in Table B or C for that operation.***

~~(b) No certificate holder may assign and no flightcrew member may accept assignment to a flight duty period if the flightcrew member has reported for a flight duty period too fatigued to safely perform his or her assigned duties or if the certificate holder believes that the flightcrew member is too fatigued to safely perform his or her assigned duties.~~

(b) ~~*(c)*~~ No certificate holder may permit a flightcrew member to continue a flight duty period if the flightcrew member has reported himself too fatigued to continue the assigned flight duty period.

~~(d) Any person who suspects a flightcrew member of being too fatigued to perform his or her duties during flight must immediately report that information to the certificate holder.~~

~~(e) Once notified of possible flightcrew member fatigue, the certificate holder must evaluate the flightcrew member for fitness for duty. The evaluation must be conducted by a person trained in accordance with Sec. 117.11 and must be completed before the flightcrew member begins or continues an FDP.~~

(c) ~~***(f)***~~ As part of the dispatch or flight release, as applicable, each flightcrew member must affirmatively state he or she is fit for duty prior to commencing flight.

(d) ~~***(g)***~~ Each certificate holder must develop and implement an internal evaluation and audit program approved by the Administrator that will monitor whether flightcrew members are reporting for FDPs fit for duty and correct any deficiencies.

NACA Comment: In general, this section, as written, cannot be realistically implemented in any aviation operating environment. While NACA does not request that the entire section be removed, NACA believes it must be significantly simplified. Specifically, subsection (b) hinges upon what a certificate holder "believes" regardless of physical evidence. Upon what will the certificate holder base its decision? Subsection (d) will invite widespread erroneous input by persons with questionable motives. Subsections (b), (d), and (e) cannot be implemented without extensive development of medical standards, fielding of medical equipment and assumption of significant legal liability. NACA agrees there must be a joint responsibility for safety and fatigue mitigation. The crewmember must have the responsibility that he/she must report fatigue when the situation would preclude safe flight. The training envisioned in each carrier's fatigue risk management plan ("FRMP") must be developed and implemented to build confidence in our understanding of fatigue and its mitigations before any requirement in this section can be confidently met. As that training and confidence building is accomplished, crewmembers will know how to better prepare for FDPs and when to report themselves to be too fatigued to enter or continue a FDP.

NACA Recommendation: Add the language above to clarify subsection (a), and eliminate subsections (b), (d), and (e).

Sec. 117.7. Fatigue risk management system.

(a) No certificate holder may exceed any provision of this part unless approved by the FAA under a Fatigue Risk Management System that provides at least an equivalent level of protection against fatigue-related accidents or incidents as the other provisions of this part.

(b) The Fatigue Risk Management System must include:

(1) A fatigue risk management policy.

(2) An education and awareness training program.

(3) A fatigue reporting system.

(4) A system for monitoring flightcrew fatigue.

(5) An incident reporting process.

(6) A performance evaluation.

(c) Whenever the Administrator finds that revisions are necessary for the continued adequacy of an FRMS that has been granted final approval, the certificate holder must, after notification, make any changes in the program deemed necessary by the Administrator.

NACA Comment: NACA supports the FRMP and the concepts of using a Fatigue Risk Management System ("FRMS") for fatigue management and risk mitigation. The FRMS, however, must first be based on a flight and duty time regulation that adequately addresses the rest and flight requirements of each segment of the affected community including non-scheduled carriers' operations. NACA is concerned that this section as drafted does not provide any foundation for uniform application of this section to non-scheduled carriers and scheduled carriers. NACA believes that, should proposed Part 117 not be changed to accommodate non-scheduled cargo and passenger operations as recommended by NACA, the final regulations must not be implemented until the FAA and industry have a clear understanding of the parameters and implementation of FRMS so that competitive advantages are not realized through differing interpretations and implementations of FRMS.

Sec. 117.9 Schedule reliability.

~~(a) Each certificate holder must adjust within 60 days --~~

~~(1) Its system-wide flight duty periods if the total actual flight duty periods exceed the scheduled flight duty periods more than 5 percent of the time, and~~

~~(2) Any scheduled flight duty period that is shown to actually exceed the schedule 20 percent of the time.~~

~~(b) Each certificate holder must submit a report detailing the scheduling reliability adjustments required in paragraph (a) of this section to the FAA every two months detailing both overall schedule reliability and pairing-specific reliability. Submissions must consist of:~~

~~(1) The carrier's entire crew pairing schedule for the previous 2-month period, including the total anticipated length of each set of crew pairings and the regulatory limit on such pairings;~~

~~(2) The actual length of each set of crew pairings, and~~

~~(3) The percentage of discrepancy between the two data sets on both a cumulative, and a pairing-specific basis.~~

Rewrite section 117.9 as follows:

Each certificate holder must record each extension to the maximum FDP limitations shown at Table B and C and report them to the FAA quarterly. Reports must include the scheduled FDP hours at time of report for duty involving flight; the actual FDP hours; and a brief explanation for the extension.

NACA Comment: This reliability standard does not consider or accommodate the non-scheduled community. This provision appears to assume that all operations are scheduled operations with established stations and regular routes and ignores the operational needs of non-scheduled carriers which do not have established stations and regular routes. In non-scheduled operations, the customer determines the departure airport and time, as well as the destination airport. Non-scheduled operations only infrequently operate on the initial schedule agreed-upon by the certificate holder and the customer because of the nature of the customer's requirements.

In answering a question about how the schedule is to be measured in non-scheduled operations, the FAA stated in Document FAA-2009-1093-0365, at 8, that "[t]he requirements for schedule reliability are not a function of scheduled service versus unscheduled service. Rather, 'scheduled' in this instance means "times assigned by a certificate holder when a crewmember is required to report for duty." Non-scheduled carriers offer service that moves when the customer is ready to move, not on a schedule of the carrier's making. Every scheduled or non-scheduled operation must be permitted to operate up to the maximum FDP established for time-of-day and number of segments as shown in Tables B or C of the NPRM. In general, a quarterly report consisting of actual FDP extensions will best describe interruptions to "schedule reliability" for both scheduled and non-scheduled operations.

NACA Recommendation: Rewrite this section as shown above.

Sec. 117.11 Fatigue education and training program.

(a) Each certificate holder must develop and implement an education and training program, approved by the Administrator, applicable to all employees ***determined by the certificate holder to require the training, but the training must include pilots, dispatchers, schedulers and the Director of Operations.***
~~of the certificate holder responsible for administering the provisions of this rule including flightcrew members, dispatchers, individuals involved in the scheduling of flightcrew members, individuals involved in operational control, and any employee providing management oversight of those areas.~~

(b)~~(1) Initial training for all individuals listed in paragraph (a) of this section must consist of at least 5 programmed hours of instruction in the subjects listed in paragraph (b)(3) of this section.~~

~~(2) Recurrent training for all individuals listed in paragraph (a) of this section must be given on an annual basis and must consist of 2 programmed hours of instruction in the subjects listed in paragraph~~
~~(b)(3) of this section.~~

(b) ~~(3)~~ The fatigue education and training program must include information on--

(i) FAA regulatory requirements for flight, duty and rest and NTSB recommendations on fatigue management.

(ii) Basics of fatigue, including sleep fundamentals and circadian rhythms.

(iii) Causes of fatigue, including possible medical conditions.

(iv) Effect of fatigue on performance.

(v) Fatigue countermeasures.

(vi) Fatigue prevention and mitigation.

(vii) Influence of lifestyle, including nutrition, exercise, and family life, on fatigue.

(viii) Familiarity with sleep disorders and their possible treatments.
(ix) Responsible commuting.
(x) Flightcrew member responsibility for ensuring adequate rest and fitness for duty.
(xi) Operating through and within multiple time zones.

(c) Whenever the Administrator finds that revisions are necessary for the continued adequacy of a fatigue education and training program that has been granted final approval, the certificate holder must, after notification, make any changes in the program that are deemed necessary by the Administrator.

NACA Comment: NACA fully supports fatigue education and training. Indeed, true fatigue management is as much about an individual's training, discipline and the management of his or her life style as it is a prescriptive regulatory process. The FRMP, as being implemented by airlines and the FAA, will provide the basis for that.

In general, subsection (a) appears too broad and all-inclusive. There are subtle differences between scheduled and non-scheduled operations that place the regulatory responsibility for dispatch of a flight on different individuals. Furthermore, within each sector's operating environment – cargo, passenger, scheduled and non-scheduled – there are subtle differences in the manner in which airlines manage these regulatory requirements. Beyond pilots, dispatchers, schedulers, and the Director of Operations, each airline must be permitted to determine which employees require training.

The requirement of certain hours of training in subsection (b) appears to have no basis in science. Thus, NACA recommends that they be deleted. Additionally, the preamble appears to require initial training for new hires only, but subsection (b) is not consistent with that concept. The fact that this program has to be approved by the Administrator and will be part of a FRMP should permit each carrier to formulate its training program, including the number of hours required, for that approval. Perhaps by the time the program has to be implemented, the FAA and industry can produce some model training programs to achieve the intent of fatigue training.

NACA Recommendation**:** Implement the changes to section 117.11(a) shown above. Delete section 117.11(b(1)and (2) above and renumber subsequent paragraphs accordingly.

~~Sec. 117.13 Flight time limitation.~~

~~No certificate holder may schedule and no flightcrew member may accept an assignment or continue an assigned flight duty period if the total flight time:~~
~~(a) Will exceed the limits specified in Table A of this part if the operation is conducted with the minimum required flightcrew.~~
~~(b) Will exceed 16 hours if the operation is conducted with an augmented flightcrew.~~

NACA Comment: NACA is opposed to the inclusion of flight time limits in this regulation. In fact, the FAA's answers to clarifying questions on this subject in Document FAA-2009-1093-0365 increase NACA's concerns about the complexity of scheduling around too many limitations. The discussion of flight and duty regulatory change for the past two decades has focused on the transition from a regulation based upon flight time limits to a science-based regulation of flight duty periods. Beyond that philosophical consideration, the FAA's proposed flight time scheme of hourly limits for an un-augmented crew is not consistent with the hours of operational limits for FDPs. Furthermore, this limitation is particularly oppressive as it applies to un-augmented crews in a three-person cockpit (2 pilots & one flight engineer ("FE")). Those three-person cockpit aircraft were engineered and manufactured, as certificated by FAA, based upon the international scheduled and non-scheduled commercial air transportation needs. Current regulations at 14 C.F.R. Subparts R and S recognize the added safety of the FE, even though in some cases the FE is not qualified to land the aircraft. While aircraft with three-person cockpits are no longer manufactured and current fleets will eventually phase out of the inventory, the phase-out will not occur in the first several years of implementation of this proposal. The costs of operations encountered by not permitting the three-person cockpit to continue to be an augmented crew will destroy the commercial viability of those aircraft prematurely. There is no evidence that these significant costs are considered in the FAA's cost-benefit analysis.

NACA agrees with the concept of science-based, fatigue mitigated FDPs and fatigue-mitigating rest. Restrictions on FDPs, which include ground time for pre- and post-flight duties and the turn times involved with multiple mission segments, will concurrently provide reasonable limits to actual flight time. In the ARC discussions set forth in Document FAA-2009-1093-005, Dr. Hursh stated that "duty time, and not flight time, is what limits pilots' opportunity to sleep." Similarly, Dr. Belenky noted that "duty time limitations are a stronger predictor of sleep and rest opportunities than flight time limitations." *See* Appx. F, No. 17, p.258. Additionally, neither CAP-371 nor EASA Subpart Q contains daily flight limits. Adding another layer of limitations for flight time will not provide additional safety. It will merely have the unintended consequence of preventing pilots from flying as much and thereby reducing their proficiency, thus their safety; and reducing productivity, international competitive posture, and pilots' pay.

NACA Recommendation: Delete this section.

Sec. 117.15 Flight duty period: Un-augmented operations.

(a) Except as provided for ***in section 117.15(b)*** and in Sec. 117.17, no certificate holder may assign and no flightcrew member may accept an assignment for an un-augmented flight operation if the scheduled flight duty period will exceed the limits in Table B of this part.

(b) In the case of an aircraft with a three-person cockpit with an un-augmented crew, a certificate holder may assign and a crewmember may accept a flight duty period that is extended up to 2 hours beyond the applicable flight duty period for an un-augmented flightcrew in Table B. In no case may the flight duty period exceed 16 hours.

(c) ~~***(b)***~~ If the flightcrew member is not acclimated:

(1) The maximum flight duty period in Table B of this part is reduced by ***one hour*** ~~***30 minutes***~~.

(2) The applicable flight duty period is based on the local time at the flightcrew member's home base ***or acclimated location.***

(d) ~~***(c)***~~ In the event unforeseen circumstances arise:

(1) The ~~pilot in command and~~ certificate holder may extend a flight duty period up to 2 hours, ***unless the pilot in command reports at the time of the decision that the crew is too fatigued to continue.***

(2) An extension in the flight duty period exceeding 30 minutes may occur ***no more than two times*** ~~***only once***~~ in any 168 consecutive hour period, and never on consecutive days.

(3) Should flight duty periods be extended on two consecutive days, an intervening rest period of 16 hours must be provided prior to the next flight duty period.

NACA Comment: NACA does not agree with the FDPs set forth in Table B in the NPRM or that there can only be one extension to safe FDPs. As with other provisions in the proposed part 117, the FAA's proposal on this issue is clearly designed around domestic scheduled service and does not recognize non-scheduled cargo and passenger operations flown under Subpart S. It is too complex, completely ignores the three-person cockpit, is not based upon science, and appears to address labor issues not appropriate for regulatory actions. Lastly, the time-of-day windows set forth in Tables A and B are not synchronized. As noted above, NACA recommends that Table A and any limitations on flight time be removed from these regulations.

Federal Aviation Regulations have always recognized that the three-person cockpit provides an added safety monitor and the three-person cockpit must continue to be recognized as a safer environment for fatigue mitigation than just the two-pilot cockpit.

14 C.F.R. § 121.543(b)(2) already recognizes that a flightcrew member may be absent from the assigned duty station "in connection with physiological needs." The promulgation of new flight duty period and rest requirements would affect this section, as it would affect many other sections in Part 121. The FAA must recognize fatigue mitigation as an important reason for being absent from the assigned duty station for reasonable periods of time to mitigate fatigue and boredom through the science-supported fatigue mitigations of time-off-task, light exercise, brief socialization with other flightcrew members and/or passengers, and exposure to more intense light, when possible. These supplemental breaks were found to provide recovery from boredom and constitute important fatigue countermeasures in several studies listed in the enclosed bibliography. *See* Appx. F, Nos. 7, 9, 10, 19, 21, 23 and 24. NACA would recommend breaks every hour where safety of flight is not otherwise compromised. NACA also notes that Dr. Nesthus stated in the ARC that the Aerospace Medical Association is developing a resolution to support cockpit napping, and that short bouts of sleep are helpful out of proportion to the sleep exchange." *Id.*, No. 17, p.261. NACA encourages the FAA to enter into these discussions to determine their applicability to the proposed regulations.

The 3-person cockpit not only adds safety, but those aircraft have been the cornerstone of aviation operations around which aircraft were designed, markets were developed and some non-scheduled business is still conducted. To ignore their safety and value in this regulation will prematurely cause these aircraft to become non-competitive and will cause owners and operators significant loss of capital that is not computed in the Regulatory Impact Analysis.

<u>NACA Recommendation</u>: Mitigate fatigue through a simple, science-based flight duty period and rest requirement (*see* part 117.21 below for rest recommendations). For a two-pilot, un-augmented operations, NACA recommends a 14-hour flight duty period, as shown in NACA's Table B below, where no part of the FDP occurs during the WOCL hours of 0200 – 0600 at the pilot's home base (as assigned by the certificate holder) or acclimated location. Where the FDP encounters the WOCL, decrease the FDP by two hours. Where the pilot is un-acclimated, further decrease the FDP by one hour. Where the FDP operated over more than four segments, further decrease the FDP by one hour for each added mission segment beyond four. NACA agrees with the FAA's proposed two-hour extension for unforeseen operational circumstances. However, NACA proposes that up to two extensions be permitted in a single 168-hour look-back period as long as they are not on consecutive FDPs. If the second extension is required within 168 hours, 16 hours of rest must be provided prior to the next FDP. The scientific experts in the ARC supported occasional but not consecutive extensions of duty. *See* Appx. F, No. 17, p.82. Those experts further stated that "[r]ecovery sleep does not require additional sleep equal to the cumulative sleep debt. That is, an 8-hour sleep debt does not require 8 additional hours of sleep. However, sleep on recovery days should be extended beyond the usual sleep amount." *Id.*, p.27. NACA's proposal to extend the sleep amount to 16 hours provides for several opportunities to obtain the required recovery sleep.

The table of NACA's proposal is shown here as Table B for the purpose of replacing Table B in the NPRM. This proposal mitigates all of the types of fatigue discussed by the FAA in the preamble of the NPRM. *See* 75 Fed. Reg. 55855. Combined with the basic NACA rest period of 10 hours from crew release to show time, permitting 9 hours at a suitable accommodation, NACA's Proposal as set forth in Table B, below, ensures a sleep opportunity of more than 8 hours, provides significant mitigation for WOCL disruption, is less than the time awake limit of 17 hours, further mitigates for a non-acclimated crewmember and decreases FDP for more than four segments. NACA's further restrictions on cumulative FDP and duty ensure that its proposal is science-based and safe, yet remains flexible enough for non-scheduled and scheduled operations.

NACA Proposed
TABLE B TO PART 117
FLIGHT DUTY PERIOD: UNAUGMENTED OPERATIONS

	Acclimated Segments					
Time of start	1 - 4	5	6	7+	Extension[1]	Not Acclimated
0000-0559	12	11	10	9	2	-1
0600-1159	14	13	12	11	2	-1
1200-1259	13	12	11	10	2	-1
1300-2359	12	11	10	9	2	-1

Rest Period: For acclimated crews, a minimum of 10 hours from crew release to show time. For un-acclimated crews, a minimum of 12 hours from crew release to show time.
Note 1: Should a second extension be required within a 168-hour period, a 16-hour rest period must be provided prior to the next flight duty period.

Sec. 117.17 Flight duty period: Split duty.

~~For a split duty period, a certificate holder may extend and a flightcrew member may accept a flight duty period up to 50 percent of time that the flightcrew member spent in a suitable accommodation up to a maximum flight duty period of 12 hours provided the flightcrew member is given a minimum opportunity to rest in a suitable accommodation of 4 hours, measured from the time the flightcrew member reaches the rest facility.~~

For a split duty period, a certificate holder may extend an un-augmented flight duty period up to 90 minutes where the ground time permits a rest opportunity of at least 45 minutes with a subsequent 20-minute recovery period. Should the ground time permit a longer rest opportunity, the flight duty period may be extended by 75 per cent of the available rest opportunity for a rest facility equivalent to a Class 1 on-board rest facility; up to 50 per cent of the rest opportunity for a Class 2 rest facility; or up to 30 percent for a Class 3 rest facility, whichever is greater.

NACA Comment: NACA does not agree with the FAA proposal as written. The credit for split duty should be more science-based. NASA states that a 45-minute cockpit nap, including use of a jump seat, with a 20-minute recovery resulted in increased alertness for a minimum of 90 minutes of the flight. *See* Appx. F, No. 26. If this is applicable for the cockpit nap, this is even more applicable to a ground rest facility. The credit for in-flight rest in Class 1, 2, or 3 rest facilities is outlined in section 117.19 below. Finally, because section 117.5 already gives a flight crewmember the prerogative to cease operating by simply informing the operator of fatigue, there is no need to further restate the flightcrew prerogative to accept or decline split duty accommodations or FDP extensions here.

NACA Recommendation: Rewrite this section as shown above.

Sec. 117.19 Flight duty period: Augmented flightcrew.

The flight duty period limits in Sec. 117.15 may be extended by augmenting the flightcrew.

(a) For flight operations conducted with an acclimated augmented flightcrew, no certificate holder may assign and no flightcrew member may accept an assignment if the scheduled flight duty period will exceed the limits specified in Table C of this part.

(b) If the flightcrew member is not acclimated:

(1) The maximum flight duty period in Table C of this part is reduced by ***one hour*** ~~***30 minutes***~~.

(2) The applicable flight duty period is based on the local time at the flightcrew member's ***acclimated location or*** home base.

~~(c) No certificate holder may assign and no flightcrew member may accept an assignment under this section unless during the flight duty period:~~

~~(1) Two consecutive hours are available for in-flight rest for the flightcrew member manipulating the controls during landing;~~

~~(2) A ninety minute consecutive period is available for in-flight rest for each flightcrew member;~~

~~(3) The last flight segment provides an opportunity for in-flight rest in accordance with paragraph (c)(1) of this section.~~

~~(d) No certificate holder may assign and no flightcrew member may accept an assignment involving more than three flight segments (should we add ferry?) under this section unless the certificate holder has an approved fatigue risk management system under Sec. 117.7.~~

(e) At all times during flight, at least one flightcrew member with a PIC type-rating must be alert and on the flight deck.

(f) In the event unforeseen circumstances arise:

(1) The ~~***pilot in command and***~~ certificate holder may extend a flight duty period up to 3 hours.

(2) An extension in the flight duty period exceeding 30 minutes may occur ***no more than twice*** ~~***three times***~~ ~~only once~~ ***and not on consecutive days***, in any 168 consecutive hour period.

(3) Should flight duty periods be extended twice in 168 hours, an intervening rest of 16 hours must be provided prior to the next flight duty period or short-call reserve.

NACA Comment: NACA notes that in a detailed analysis of NTSB accidents, it found no accidents from augmented operations in which human fatigue was cited as a cause or contributing factor. NACA's recommendations in this section reduce the duty times currently in 14 C.F.R. Part 121 for 4-pilot crews by 33 percent and for 3-pilot crews by 20 percent. For that reason and based upon scientific studies referenced below, NACA does not agree with the specific maximum hours of FDP recommended by FAA's Table C for the various classes of in-flight rest facility. The FAA has used a format and calculation based upon the TNO report that is more than 10 years old and was proposed by a limited number of scientists and based upon limited studies. Since then, there have been a large number of studies on the value of in-flight rest. Dr. Belenky stated, "[a]ll other factors being equal, if the total amount of actual sleep is the same, split sleep is as valuable as continuous sleep." *See* Appx. F, No. 17, p.260. Several recent studies demonstrated that the length of performance benefits is longer than previously revealed. One study showed that 20-30 minute naps improved cognitive performance for as long as 155 minutes and a 10 minute nap improved performance for 95 minutes. *Id.*, No. 6. This was also confirmed in an analysis of 12 other studies which showed that a 15 minute nap led to a 2-hour benefit and that a 4-hour nap led to as much as a 10-hour benefit. *Id.*, No. 16. In the ARC discussions, Dr. Hursh stated that his models value sleep on a bunk at approximately 66 to 80 percent of normal sleep, and values sleep in a coach seat at approximately 50 percent of the value of normal sleep. *Id.*, No. 17. NACA's maximum FDPs shown in NACA Table C below grants approximately those percentages of credit. They are also approximately within range of the TMO credit of 75, 55 and 25 per cent based upon class of seat. Finally, in comparing NACA's 3- and 4-pilot per cent extension credit for augmented versus un-augmented crew hours against FAA's credit, NACA's percent credit is significantly smaller in most areas except for a 4-pilot crew in a class 3 rest facility during non-WOCL hours. Considering all of the science referenced above, but specifically the science that supports a coach seat for a planned sleep opportunity (*see* Appx. F, No. 26, p.2), NACA presents well-conceived, fatigue-mitigated augmented flight duty period limits.

NACA is opposed to FAA's proposed sections 117(c) and (d). Additionally, the FAA's answers to clarifying questions in Document 2009-1093-0365, at 15, is confusing and appears to misrepresent the language as proposed at 117.19(c). It states, "[a]ugmentation does not require that each flight segment provide a 2-hour rest period." However, section 117.19(c)(1) states that two consecutive hours in-flight rest must be available for the pilot making the landing. If there is more than one segment, there will be more than one landing. Thus, it implies at least two hours rest opportunity in each segment. The FAA does not cite specific science for this requirement. Furthermore, there is ample scientific evidence that this is not necessary. *See* Appx. F, Nos. 3, 4, 6, 14-16, 23, 25-28.

Other statements within the FAA's answer to clarifying questions do clarify that the FAA does not expect that each augmented flight segment require sufficient flight time at cruise to provide all pilots an in-flight rest on each trip segment. NACA agrees with that clarification. However, NACA cannot agree that the last flight segment must have an in-flight rest segment, as the last segment of augmented flight operations is often less than two hours.

In light of the confusion caused by the proposed language and the FAA's answers to questions noted above, NACA recommends that the FAA withdraw sections 117.19(c) and 117.19(d) above. The rationale is that crew rostering and on-the-scene cockpit resource management by the crewmembers will best permit timely rest for the pilot with the greatest need. Finally, as noted above, a thorough search of NTSB data did not reveal any human factors-related accidents involving augmented crews, thus NACA believes there is no need for the FAA to insert revised language for sections 117.19(c) and 117.19(d).

NACA does not agree that the number of mission segments needs to be limited to three. NACA believes the construction of subsection f(1) is incorrect as noted above. NACA proposes two non consecutive FDP extensions in 168 hours, with a 16-hour rest period required if the second extension actually occurs. As noted in NACA's comments on section 117.15 above, science supports this position. The NACA-proposed Table C below reduces the length of FDPs by one hour for an un-acclimated flightcrew versus the 30 minutes proposed by FAA. Finally, as shown in the proposed changes to section 117.25 below, NACA proposes 12 hours rest from crew release to show time for the next FDP to assure at least 8 hours sleep at the suitable accommodation for non-acclimated locations.

NACA Recommendation: See changes in proposed text above and Table C below.

NACA Proposed
TABLE C TO PART 117—FLIGHT DUTY PERIOD: AUGMENTED OPERATIONS
FDPs not De-rated for WOCL, as in-flight rest is provided

Acclimated	**Class1**	**Class 1**	**Class 2**	**Class 2**	**Class 3**	**Class 3**
Time of Start	**3 Pilots**	**4 pilots**	**3 Pilots**	**4 pilots**	**3 Pilots**	**4 pilots**
0000-2359	**18**	**20**	**17**	**19**	**16**	**18**
Extension	**+2**	**+2**	**+2**	**+2**	**+2**	**+2**
Non-Acclimated	**-1**	**-1**	**-1**	**-1**	**-1**	**-1**

Rest Period: For acclimated crews, a minimum of 10 hours from crew release to show time. For un-acclimated crews, a minimum of 12 hours from crew release to show time.

Sec. 117.21 Reserve status.

(a) Unless specifically designated otherwise by the certificate holder, all reserve is considered long-call reserve.

(b) For airport/standby reserve, all time spent in a reserve status is part of the flightcrew member's flight duty period.

(c) For short call reserve,

(1) The period of time that the flightcrew member is in a reserve status does not count as duty. ~~***All time within the reserve availability period is duty.***~~

(2) The reserve availability period may not exceed ***16*** ~~***14***~~ hours.

(3) No certificate holder may schedule and no reserve flightcrew member on short call reserve may accept an assignment of a flight duty period that begins before the flightcrew member's next reserve availability period unless the flightcrew member is given at least ***10*** ~~***14***~~ hours rest.

(4) The maximum reserve duty period for un-augmented operations is the lesser of--

(i) 16 hours, as measured from the beginning of the reserve availability period ~~***(ii) The assigned flight duty period, as measured from the start of the flight duty period; or***~~

(ii) The flight duty period in Table B of this part plus ***6*** ~~***4***~~ hours, as measured from the beginning of the reserve availability period.

(iv) If all or a portion of a reserve flightcrew member's reserve availability period falls between 0000 and 0600, the certificate holder may increase the maximum reserve duty period in paragraph (c)(4)(iii) of this section by ***the full*** ~~***one-half of the***~~ length of the time during the reserve availability period in which the certificate holder did not contact the flightcrew member~~***, not to exceed 3 hours***~~.

(5) The maximum reserve duty period for augmented operations is the lesser of--

(i) The assigned flight duty period, as measured from the start of the flight duty period; or

(ii) The flight duty period in Table C of this part plus ***6*** ~~***4***~~ hours, as measured from the beginning of the reserve availability period.

(iii) If all or a portion of a reserve flightcrew member's reserve availability period falls between 0000 and 0600, the certificate holder may increase the maximum reserve duty period in paragraph (c)(5)(ii) of this section by ***the full*** ~~***one-half of the***~~ length of the time during the reserve availability period in which the certificate holder did not contact the flightcrew member, ~~***not to exceed 3 hours***~~.

(d) For long call reserve,

(1) The period of time that the flightcrew member is in a reserve status does not count as duty.

(2) If a certificate holder contacts a flightcrew member to assign him or her to a flight duty period or a short call reserve, the flightcrew member must receive the required rest period specified in Sec. 117.25 prior to reporting for the flight duty period or commencing the short call reserve duty.

(3) If a certificate holder contacts a flightcrew member to assign him or her to a flight duty period that will begin before and operate into the flightcrew member's window of circadian low, the flightcrew member must receive a 12 hour notice of report time from the air carrier.

~~***(e) An air carrier may shift a reserve flightcrew member's reserve availability period under the following conditions:***~~

~~***(1) A shift to a later reserve availability period may not exceed 12 hours.***~~

~~***(2) A shift to an earlier reserve availability period may not exceed 5 hours, unless the shift is into the flightcrew member's window of circadian low, in which case the shift may not exceed 3 hours.***~~

~~***(3) A shift to an earlier reserve period may not occur on any consecutive calendar days.***~~

~~***(4) The total shifts in a reserve availability period in paragraphs (e)(1) through (e)(3) of this section may not exceed a total of 12 hours in any 168 consecutive hours.***~~

NACA Comment: This proposal appears to be built specifically for scheduled operations. While U.S. certificate holders and their crewmembers have decades of experience with long- and short-call reserve and airport standby, reserve limits have never been incorporated into regulations. The prescriptive requirements of this section of the proposal are confusing in just this section, and they are illogical in consideration of other sections on duty and rest requirements and the definitions within the proposal. There was no agreement in the ARC for calling "short-call reserve" duty.

Availability of reserve crewmembers is one of the two most significant issues in this proposal for non-scheduled operations. Without significant change, the proposed regulation will cripple world-wide non-scheduled air transportation which must, in most cases, be operated with augmented crews or must be operated with only one reserve crew available because non-scheduled operations do not have crew bases structured along the route of flight. In most cases, a reserve crew will have deadheaded to a rest location where a technical stop is planned for crew change. If the flight is delayed, the reserve crewmembers must be kept at a suitable accommodation until called out. NACA recommends a basic short-call reserve duty of 16 hours on/8 hours off so that, if the crewmember is called out in the first six hours, he or she can utilize the entire maximum FDP as prescribed at Table B or Table C. When a crewmember is called out after that, all time in short call reserve should be subtracted from the maximum FDP, unless the un-interrupted short call reserve included the crewmember's WOCL. In that case, the full period of the WOCL should be considered rest. This scheme is necessary to permit long-haul non-scheduled operations to continue and can be accommodated within NACA's Proposal as presented.

Furthermore, the proposed scheme for shifting short-call reserve periods is illogical in light of the fact that a crewmember in long-call reserve can respond to an assignment to reserve or flight duty with only 9 hours rest (*see* § 117.25(d)). This section must be deleted.

NACA Recommendation: Make changes shown above.

Sec. 117.23 Cumulative duty limitations.

(a) The limitations of this section on flightcrew members apply to all commercial flying by the flightcrew member during the applicable periods.
~~(b) No certificate holder may schedule and no flightcrew member may accept an assignment if the flightcrew member's total flight time will exceed the following:~~
~~(1) 100 hours in any 28 consecutive calendar day period and~~
~~(2) 1,000 hours in any 365 consecutive calendar day period.~~
(b) ~~(c)~~ No certificate holder may schedule and no flightcrew member may accept an assignment if the flightcrew member's total Flight Duty
Period will exceed:
(1) 75 ~~60~~ flight duty period hours in any 168 consecutive hours and
(2) 215 ~~*190*~~ flight duty period hours in any 672 consecutive hours.

(d) Except as provided for in paragraph (d)(3) of this section, no certificate holder may schedule and no flightcrew member may accept an assignment if the flightcrew member's total duty period will exceed:

(1) 80 65 duty hours in any 168 consecutive hours and
(2) 215 200 duty hours in any 672 consecutive hours.
~~(3) If a flightcrew member is assigned to short-call reserve or a certificate holder transports a flightcrew member in deadhead transportation in, at a minimum, a seat in aircraft cabin that allows for a flat or near flat sleeping position, the total duty period may not exceed:~~
~~(i) 75 duty hours in any 168 consecutive hours and~~
~~(ii) 215 duty hours in any 672 consecutive hours.~~
~~(4) Extension of the duty period under paragraph (d)(3) of this section is limited to the amount of time spent on short-call reserve or in deadhead transportation.~~

NACA Comment: As to cumulative flight time limitations in section 117.23(b), NACA has already commented on section 117.13 above that there is no need for flight time limits when FDP and other science-based fatigue mitigations provide the basis for this regulation. The scientists who advised the ARC agreed on that concept. In addition, to add flight time limits at 365 days would imply that carriers have failed to mitigate fatigue on a continuing basis. That will be totally unsatisfactory. Carriers must mitigate fatigue in a timely manner, but flight time limits need not be prescribed.

The FAA's proposed cumulative duty limits are entirely too restrictive for non-scheduled operations and can and should be changed as reflected in NACA's Proposal. Furthermore, sections 117.23(d)(3) and (4) are already included in the sections above them. If the FAA's rationale for section 117.27(d)(3) is science-based then there is absolutely no reason why the same limits for maximum FDP cannot be established using the 168-hour period.

In the FAA's answers to clarifying questions pertaining to 117.23 in Document FAA-2009-1093-0365, it stated "[t]he question of whether a certificate holder should be allowed to assign additional duty time if there is no additional FDP contemplated for the relevant time period strikes the FAA as a fair one, and the agency seeks input on this matter." There is no further risk of an aviation accident unless flight is involved. As the FDP is over, the certificate holder should be able to assign duty not involving flight.

NACA does not agree with many of the statements in the FAA's answers to clarifying questions pertaining to 117.23 in Document FAA-2009-1093-0365. For example, NACA agrees that long-call reserve is not duty. However, the certificate holder must be able to contact the crewmember to assign the required rest and to schedule the new flight duty period after the rest. The FAA's statement that the certificate holder must track the time a crewmember is commuting defies the FAA's position that commuting will not be addressed in the regulations. It also defies the concept that the crewmember is free to choose its home location as well as the shared responsibility the crewmember has for fatigue mitigation. With all the other fatigue mitigations, tracking time that a crewmember is not technically in duty is unnecessary. The FAA's statement that "the certificate holder cannot allow the individual to be free from duty because of circumstances beyond its control" also is baffling. NACA is opposed to the concept that union time is science-based flight and duty regulations. The comments introduce quality of life issues that need not be in prescriptive regulations.

The FAA’s answers to questions on airport/reserve and FDP also stimulate another NACA position as noted in the definition of “flight duty period” above. Specifically, where airport/reserve and/or flight duty period is scheduled but not performed, the hours should not be included in the cumulative limits for FDP. They should be included in the cumulative limits for “duty.”

NACA has made every effort in its proposal to mitigate fatigue with rest – specifically, with sleep opportunity. Sleep is the fatigue mitigation of science. NACA’s Proposal increases the FAA’s proposed rest after each FDP; provides compensatory rest when two or more normal FDPs are exceeded; decreases applicable FDP limits more than the FAA does for non-acclimated situations; provides an increase from the current standard of 24-in-7 to 30 hours off in the 168 hour look-back; and takes better advantage of split duty rest. Combine all of these improvements with both the need and the desire to have a science-based FRMP based upon the NACA Proposal as presented, we achieve our common goal of safe, fatigue mitigated FDP limitations and rest requirements. The limits to cumulative duty in the NACA changes prevent a certificate holder from assigning a crewmember to more than two full 168-hour maximum operating periods in a 28-day period. “Drs. Belenky and Hursh stated that occasional extensions of duty would likely be okay, but consecutive extensions would not be.” *See* Appx. F, No. 17, p.264. This is science-based fatigue mitigation.

NACA Recommendation: Change section 117.23 as shown above.

Sec. 117.25 Rest period.

(a) No certificate holder may assign and no flightcrew member may accept assignment to any reserve or duty with the certificate holder during any required rest period.

(b) Before beginning any short call reserve or flight duty period, a flightcrew member must be given at least 30 consecutive hours free from all duty in any 168 consecutive hour period, except that:

(1) If a flightcrew member crosses more than four time zones during a series of flight duty periods that exceed 168 consecutive hours, the flightcrew member must be given a minimum of ***30 hours*** ~~three physiological nights~~ rest upon return to home base.

(2) A flightcrew member operating in a new theater must receive ***30*** ~~36~~ hours of consecutive rest in any 168 consecutive-hour period.

(c) No certificate holder may reduce a rest period more than once in any 168 consecutive hour period.

(d) No certificate holder may schedule and no flightcrew member may accept an assignment for reserve or a flight duty period unless the flightcrew member is given a rest period of at least ***10 hours from crew release to show time for the next FDP at acclimated locations.*** ~~9 consecutive hours before beginning the reserve or flight duty period measured from the time the flightcrew member reaches the hotel or other suitable accommodation.~~

(e) At international non-acclimated locations the minimum rest is not less than 12 hours from crew release to show time for the next FDP.

(f) In the event of unforeseen circumstances ***at acclimated locations***, the pilot in command and certificate holder may reduce the 10 consecutive hour rest period in paragraph (d) of this section to 9 consecutive hours. ***At non-acclimated locations, the rest period may be reduced to 11 hours.***

NACA Comment: NACA does not agree that three physiological nights rest is required upon return to home base because fatigue has been mitigated throughout the crewmember's trip experience. NACA sees no need to provide a different standard for rest at home. On the contrary, rest at home is generally more fatigue mitigating than rest at operating locations. Furthermore, any added rest requirement will hamper certificate holders' flexibility to give crew member negotiated time off, as is already the case in labor – management relations at all of NACA's member airlines.

NACA does not believe any accurate tracking mechanism can be constructed to assure that each crewmember actually arrives at the suitable accommodation over millions of flights per year. That construction is simply not acceptable within commercial scheduling. Thus, NACA's proposal increases the rest period to 10 or 12 hours depending upon whether the crewmember is acclimated or not. This will provide ample opportunity for an 8-hour sleep opportunity at the suitable accommodation. Sleep mitigates fatigue. NACA believes that more hours rest at non-acclimated locations will better mitigate fatigue in non-scheduled operations.

NACA Recommendation: See recommended changes above.

~~Sec. 117.27 Consecutive nighttime operations.~~

~~No certificate holder may schedule and no flightcrew member may accept more than three consecutive nighttime flight duty periods unless the certificate holder provides an opportunity to rest during the flight duty period in accordance with Sec. 117.17.~~

NACA Comment: NACA's Proposal is structured to mitigate cumulative fatigue using limited FDPs, significant reductions for FDPs that encounter night operations (specifically encounters with the WOCL), and the provision of significant rest periods. With all the fatigue mitigation built into the regulations above this section, NACA sees no need for this section.

NACA Recommendation: Remove this section.

Sec. 117.29 Deadhead transportation.

(a) All time spent in deadhead transportation is considered part of a duty period.

(b) Time spent in deadhead transportation is considered part of a flight duty period if it occurs before a flight segment without an intervening required rest period.

~~(c) Time spent entirely in deadhead transportation during a duty period may not exceed the flight duty period in Table B of this part for the applicable time of start plus 2 hours unless the flightcrew member is given a rest period equal to the length of the deadhead transportation but not less than the required rest in Sec. 117.25 upon completion of such transportation.~~

NACA Comment: Subsection (c) is unnecessary. Deadhead assigned by the certificate holder is duty, and section 117.25 prescribes required rest before a short-call reserve or FDP. If the language at (c) is not deleted, this would imply that the certificate holder should prevent a crewmember from deadheading home at the end of a FDP, even if the crewmember requests to do so. Additionally, the rest period proposed is punitive and not supported by science. Otherwise, the FAA could not propose a 9-hour rest period between FDPs.

NACA Recommendation: Delete section subsection (c).

Sec. 117.31 Operations into ***unique*** ~~***unsafe***~~ areas.

(a) This section applies to operations that cannot otherwise be conducted under this part because of unique circumstances that could prevent flightcrew members from being relieved by another crew or safely provided with the rest required under Sec. 117.25 at the end of the applicable flight duty period.

(b) A certificate holder may exceed the maximum applicable flight duty periods to the extent necessary to allow the flightcrew to fly to a destination where they can safely be relieved from duty by another flightcrew or can receive the requisite amount of rest prior to commencing their next flight duty period.

(c) The flightcrew shall be given a rest period immediately after reaching the destination described in paragraph (b) of this section equal to the length of the actual flight duty period or 24 hours, whichever is less.

(d) No extension of the cumulative fatigue limitations in Sec. 117.3 is permitted.

(e) If the operation was conducted under contract with an agency or department of the United States Government, each affected air carrier must submit a report every 60 days detailing the--

(1) Number of times in the reporting period it relied on this section to conduct its operations.

(2) For each occurrence,

(i) The reasons for exceeding the applicable flight duty period;

(ii) The extent to which the applicable flight duty period was exceeded; and

(iii) The reason the operation could not be completed consistent with the requirements of this part.

(f) If the operation was not conducted under contract with an agency or Department of the United States Government, each affected air carrier must submit a report within 14 days of each occurrence detailing--

(1) The reasons for exceeding the applicable flight duty period;

(2) The extent to which the applicable flight duty period was exceeded; and

(3) The reason the operation could not be completed consistent with the requirements of this part.

(g) Should the Administrator determine that a certificate holder is relying on the provisions on this section the Administrator may require the certificate holder to develop and implement a fatigue risk management system.

NACA Comment: NACA believes that better nomenclature would be to not refer to areas of operations as “unsafe areas.” NACA agrees that some unique circumstances will justify deviation from the prescriptive limitations of this part. However, the FAA answer to clarifying questions in Document FAA-2009-1093-0365 actually causes NACA further concern on the FAA’s intent with this section. The FAA appears unable or reluctant to define “unsafe areas” but will permit them on a planned and unplanned basis. Also, the FAA states that it does not anticipate use of this paragraph “into safe areas in support of the U.S. military.” Document FAA-2009-1093-0365, p.24. That leaves the individual certificate holder with the dilemma of presuming a “safe area” is not an “unsafe area,” which is not defined. Also, if this section cannot be used for military flight to “safe areas,” does that also mean it could not be used for charters to other government agencies under circumstances such as humanitarian relief or deportation of illegal immigrants?

NACA Recommendation: Remove “unsafe” and use “unique.” Be more specific in guidance in the final rule.

~~Table A to Part 117--Maximum Flight Time Limits for Un-augmented Operations~~

~~Time of start (Home base)~~	~~Maximum flight time (hours)~~
~~0000-0459~~	~~8~~
~~0500-0659~~	~~9~~
~~0700-1259~~	~~10~~
~~1300-1959~~	~~9~~
~~2000-2359~~	~~8~~

~~Table B to Part 117--Flight Duty Period: Unaugmented Operations~~

~~Time of start (Home base or acclimated)~~	~~Maximum flight duty period (hours) for lineholders based on number of flight segments~~						
	~~1~~	~~2~~	~~3~~	~~4~~	~~5~~	~~6~~	~~7+~~

~~0000-0359.........~~	~~9~~	~~9~~	~~9~~	~~9.~~	~~9~~	~~9~~	~~9~~
~~0400-0459..........~~	~~10~~	~~10~~	~~9~~	~~9~~	~~9~~	~~9~~	~~9~~
~~0500-0559........~~	~~11~~	~~11~~	~~11~~	~~11~~	~~10~~	~~9.5~~	~~9~~
~~0600-0659........~~	~~12~~	~~12~~	~~12~~	~~12~~	~~11.5~~	~~11~~	~~10.5~~
~~0700-1259.........~~	~~13~~	~~13~~	~~13~~	~~13~~	~~12.5~~	~~12~~	~~11~~
~~1300-1659..........~~	~~12~~	~~12~~	~~12~~	~~12~~	~~11.5~~	~~11~~	~~10.5~~
~~1700-2159.........~~	~~11~~	~~11~~	~~10~~	~~10~~	~~9.5~~	~~9~~	~~9~~
~~2200-2259.......~~	~~10.5~~	~~10.5~~	~~9.5~~	~~9.5~~	~~9~~	~~9~~	~~9~~
~~2300-2359........~~	~~9.5~~	~~9.5~~	~~9~~	~~9~~	~~9~~	~~9~~	~~9~~

~~Table C to Part 117--Flight Duty Period: Augmented Operations~~

~~Time of start (local time)~~	~~Maximum flight duty period (hours) based on rest facility and number of pilots~~					
	~~Class 1 rest facility~~		~~Class 2 rest facility~~		~~Class 3 rest facility~~	
	~~3 Pilots~~	~~4 Pilots~~	~~3 Pilots~~	~~4 Pilots~~	~~3 Pilots~~	~~4 Pilots~~
~~0000-0559........~~	~~14~~	~~16~~	~~13~~	~~14.5~~	~~12~~	~~12.5~~
~~0600-0659........~~	~~15~~	~~17.5~~	~~14~~	~~15.5~~	~~13~~	~~13.5~~
~~0700-1259........~~	~~16~~	~~18~~	~~15.5~~	~~17~~	~~14~~	~~14.5~~
~~1300-1659........~~	~~15~~	~~17.5~~	~~14~~	~~15.5~~	~~13~~	~~13.5~~
~~1700-2359........~~	~~14~~	~~16~~	~~13~~	~~14.5~~	~~12~~	~~12.5~~

NACA Recommendation: *See* NACA Tables B and C above. Once flight time limits have been removed from this proposal as recommended by NACA, tables of FDP limits should be re-named as Table A and Table B.

APPENDIX C

to

Comments of National Air Carrier Association

(November 15, 2010)

Docket FAA-2009-1093

Responses to Questions in NPRM

NACA's Answers to NPRM Questions

D. Flight Duty Period

1. **Please comment on adopting maximum FDPs. Should the maximum FDP vary based on the time of day? Should it vary based on the number of scheduled flight segments? Should the proposed limits be modified up or down, and to what degree? Please provide supporting data.**

   a. **Should the Maximum FDP vary based on the time of day?**

Yes. However, the FAA proposal is clearly designed around domestic scheduled service operations; gives no consideration to non-scheduled cargo and passenger (henceforth non-scheduled) operations; is much more complex than necessary; presents no science to support the specific numbers; appears to include industrial concerns undesirable in prescriptive regulations; and the Table A and Table B time-of-day windows are not synchronized. This strongly suggests random FAA selection of flight time limits and/or FDPs based upon CAP371, EU proposals, and non-consensus positions offered in the ARC. NACA offers a much simpler FDP and rest format to mitigate fatigue in the responses to specific Part 117 sections in Appendix B. To the extent the FAA continues to insist upon a one-size-fits-all approach, NACA recommends that the FAA consider the needs of non-scheduled operations by adopting the NACA Proposal set forth in Appendix A. To pattern the U.S. Federal aviation Regulations after the CAP371 and EU OPS subpart Q prescriptions to European leadership is to cede worldwide commercial competition to European airlines with no assurance of fatigue mitigation or increased safety.

   b. **Should it vary based on the number of scheduled flight segments?**

Yes. However, NACA does not agree with the FAA' proposed flight duty periods ("FDPs"). NACA's proposed FDPs, as set forth in its comments pertaining to Part 117.15 in Appendix B, recognize all of the common fatigue issues. NACA's Proposal offers fatigue mitigation based upon number of segments, with similar FDPs of 14 hrs for segments 1 thru 4 complete with mitigation for WOCL with a 2-hour reduction where the FDP encounters the WOCL at any point. NACA further recommends that FDPs for each segment from 5 – 7 (maximum segments) should be reduced 1 hour each resulting in a maximum FDP of 14 hours for segments 1 thru 4; 13 hours for 5 segments; 12 hours for 6 segments; and 11 hours for a maximum of 7-segments that do not encounter the WOCL.

c. **Should the proposed limits be modified up or down, and to what degree?**

Yes. As stated above and in NACA's responses to section 117.15 in Appendix A, the maximum FDP should be increased to 14 hours for up to 4 segments. FDPs for additional segments (5+) are reduced one hour for each added segment operated, as noted in 1.b. above and the NACA Table B. Non-augmented FDPs are further de-rated where the FDP encounters the WOCL. That provides a minimum of 10 - 12 hours off duty, depending on FDP operating location, to assure a minimum 8-hour sleep opportunity in suitable accommodations.

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d. **Please provide supporting data.**

The scientific experts noted that time on duty is dependent on rest. If 8 hours of sleep in the WOCL is available, then 16 hours is a possibility. See Appendix F, Bibliography of Sources, No. 17, p.86. NACA's Proposal recognizes and mitigates all of the common fatigue issues, including a simple formula that requires a 2-hour decrease of the applicable FDP if the scheduled FDP encounters the WOCL for even one minute, and continues to decrease the applicable FDP by one hour for each segment greater than four mission segments. NACA also specifies a scheduled 10-hour period free of duty between FDPs and schedules an opportunity for 8 hours of sleep at a facility with suitable accommodations. *See* additional scientific cites throughout Appendices A & B.

2. **Please comment on permitting flightcrew members and carriers to operate beyond scheduled FDP. Is the proposed 2-hour extension appropriate? Is the restriction on a single occurrence beyond 30 minutes in a 168-hour period appropriate? Should a flightcrew member be restricted to a single occurrence regardless of the length of the extension? Please provide supporting data.**

a. **Please comment on permitting flightcrew members and carriers to operate beyond a scheduled FDP.**

NACA agrees with this concept. However, NACA cannot agree with "scheduled FDP" without further discussion and agreement. The extension in discussion is an extension occurring after a FDP actually begins and is an operation beyond the maximum FDP limit for the time of actual start, the number of segments actually flown, and the crew combination, as shown in sections 117.15 and 117.19 and at Tables B and C in the NPRM. NACA does not agree with the Proposed Rule's limit on the total extensions greater than 30 minutes to one in a 168-hour look-back period.

b. Is the proposed 2-hour extension appropriate?

Yes. However, NACA proposes a 2-hour extension for both augmented and unaugmented FDPs.

c. Is the restriction on a single occurrence beyond 30 minutes in a 168-hour period appropriate?

No. This concept appears to address industrial concerns and only works in domestic scheduled operations, at best, where the certificate holder has crews on reserve for use in lieu of extensions. There must be provisions for more extensions per 168-hour period for each particular crew pairing in non-scheduled operation. As clarified in the definition at 14 C.F.R. § 119.3, "supplemental operations" ("non-scheduled" herein) are "[o]perations for which the departure time, departure location and arrival location are specifically negotiated with the customer . . . ." While the certificate holder and the customer will agree on the departure time in advanced scheduling, customers are often not reliable in making passengers and/or cargo available for loading at the negotiated time, and the amount of time between contract and operations can be as little as hours, not days. Thus, a single crew operating more than one FDP together or in different crew pairings often experience more than one extension per 168-hour period. This can be mitigated with added rest before the second and/or subsequent extensions, and the provision of maximum FDP limits and a 30-hour period free of all duty in that same 168-hour period provided for fatigue mitigation. Furthermore, the provision for more than one extension cannot be left to individual FRMS programs, or there will be nearly 100 FDP and rest programs. This issue must be resolved in changes to the FAA language of this proposal, as specified in NACA's Comments and its comments on specific part 117 sections in Appendix B.

d. Should a flightcrew member be restricted to a single occurrence regardless of the length of the extension?

No. See NACA's responses above and its comments on specific Part 117 sections in Appendix B.

e. Please provide supporting data.

Drs. Belenky and Hursh stated that consecutive extensions should not be allowed; however, there should be the ability to perform more than one extension in a 168-hour period if restorative rest is provided. *See* Appx. F, 17, p.264. CAP371 permits extensions without limits in the 168-hour look-back period. NACA's Proposal provides restorative rest after each FDP extended beyond scheduling limits in its proposed tables at section 117.15 and 117.19.

3. **Please comment on the proposed schedule reliability reporting requirements. Should carriers be required to report on crew pairings that exceed the scheduled FDP, but not the maximum FDP listed in the FDP table?**

    a. **Please comment on the proposed schedule reliability reporting requirements.**

    The Proposed Rule, as written, does not consider non-scheduled operations and, more specifically, appears to assume scheduled operations with established stations and regular routes, as described in 14 C.F.R. Part 121, Subpart E. In non-scheduled operations, the customer determines the departure airport and time, as well as the destination airport. Non-scheduled operations consist of low-frequency, *ad hoc* or one-off commercial opportunities. There are no established stations and routes. They operate under the provisions of 14 C.F.R. Part 121, Subpart S. Non-scheduled operations only infrequently operate on the initial schedule agreed-upon by the certificate holder and the customer. The proposed section 117.9 must be rewritten as shown in NACA's specific comments on that section in Appendix B. A quarterly report consisting of actual changes to schedules that require re-setting crew rest within 24 hours of departure and FDP extensions required to accommodate actual mission accomplishment will best describe interruptions to "schedule reliability" for both scheduled and non-scheduled operations.

    b. **Should carriers be required to report on crew pairings that exceed the scheduled FDP, but not the maximum FDP listed in the FDP table?**

    No. Every scheduled or non-scheduled operation must be permitted to operate up to the maximum FDP established for time-of-day and number of segments. Quarterly reports of actual maximum FDPs exceeded are all that should be required.

4. **Should carriers be required to report on more parameters, such as cumulative duty hours or daily flight time? If so, why?**

    No. NACA recommends that any FDP that is exceeded be reported in the quarterly report suggested above. The stated purpose of the reliability reports is to insure carriers do not overuse the extension process. As noted, what is scheduled a month in advance has nothing to do with fatigue. Reporting crew pairings that exceed the scheduled FDP, but not the maximum FDP, prevents overuse of the extension process, which would possibly increase fatigue. Reports on operations within limits are unnecessary.

5. **What should be the interval between reporting requirements?**

    Quarterly.

6. **How long after discovering a problematic crew pairing should the carrier be afforded to correct the scheduling problem?**

   Quarterly reports are all that is necessary in non-scheduled operations.

E. Acclimating to a New Time Zone

7. **Is a 3-day adjustment to a new theater of operations sufficient for an individual to acclimate to the new theater?**

   NACA does not agree with a 3-day adjustment. NACA believes a 30-hour break is sufficient.

8. **Is a 36-hour break from duty sufficient for an individual to acclimate to a new theater?**

   Yes. It is more than sufficient. It should be 30 hours.

9. **Should flightcrew members be given a longer rest period when return to home base than would otherwise be provided based on moving to a new theater?**

   No. This appears to be an industrial issue, not a safety issue. According to Dr. Demitry, hotel rest is not as restful as home rest. If this is the case, why would additional rest be needed when returning home? The definition of "acclimated" in proposed section 117.3 states that "36 hours free from duty" provides acclimatization regardless of the number of time zones changed. NACA recommends 30 hours. The same must apply to coming back to home base. Additional breaks in duty may be negotiated by individuals in the bid process or through management labor agreements.

10. **Should the FAA have different requirements for flightcrew members who have been away from their home base for more than 168 hours? If so, why?**

    No. Only the science of fatigue should guide the FAA in the Proposed Rule. Again, that is not a regulatory requirement based upon science. It is an industrial consideration for management and labor to determine.

11. **Should the FAA require additional rest opportunities for multiple pairings between two time zones that have approximately 24-hour layovers at each destination? What if the scheduled FDPs are well within the maxima in the applicable FDP table or augmentation table?**

    a. **Should the FAA require additional rest opportunities for multiple pairings between two time zones that have approximately 24-hour layovers at each destination?**

    No. The only question should be "is the crewmember acclimated." If not, the applicable FDP limit should be decreased by 2 hours, as recommended in NACA's Proposal.

    b. **What if the scheduled FDPs are well within the maxima in the applicable FDP table or augmentation table?**

    No. This issue is already covered by decreasing the applicable FDP limit for flightcrew members who are not acclimated.

F. Daily Flight Time Restrictions

12. **If the FAA adopts variable FDP limits, is there a continued need for daily flight time limits?**

    No. NACA is adamantly opposed to the inclusion of flight time limits in the Proposed Rule. NACA fully agrees with fatigue mitigated scheduling based upon reasonable FDPs and the provision of prescriptive fatigue mitigating rest. Restrictions on FDPs, which include ground time for pre- and post-flight duties and the turn times involved with multiple mission segments, provide reasonable limits to actual flight time. Dr. Hursh stated that "duty time, and not flight time, is what limits pilots' opportunity to sleep," and Dr. Belenky noted that "duty time limitations are a stronger predictor of sleep and rest opportunities than flight time limitations." *See* Appx. F, No. 17, p.258. Additionally, neither CAP-371 nor EASA Subpart Q contains daily flight limits. Adding another layer of limitations will not provide additional safety. It will merely have the unintended consequence of preventing pilots from flying as much and thereby reducing productivity, international competitive posture, their pay and their proficiency.

13. **If the FAA retains daily flight limits, should they be higher or lower than proposed?**

    NACA is adamantly opposed to the inclusion of flight time limits in the Proposed Rule. As stated above, FDP limits combined with fatigue mitigating rest is the scientific prescription. Furthermore, NACA's Proposal reduces FDP based upon the number of trip segments which removes the cause for task-related fatigue in a more scientific manner than FAA's flight time limits, as it is take-offs and landings that are the most stressful tasks in aviation. *See* Appendix A. Should the FAA insist on flight time restrictions, the only reasonable limitation would be established FDP minus one hour.

14. Should modifications be made to the proposed flight time limits to recognize the relationship between realistic flight time limits and the number of flight segments in an FDP?

No. There is no justification for flight time restrictions in light of scientifically established FDP limits.

G. Mitigation Strategies

(1) Augmentation

15. Should augmentation be allowed for FDPs that consist of more than three flight segments? Does it matter if each segment provides an opportunity for some rest?

a. Should augmentation be allowed for FDPs that consist of more than three flight segments?

Yes. While NACA supports the three flight segment limit based upon its recommended FDP limits, that limit does not appear to be a science-based proposal. Furthermore, while not part of this specific question, NACA does not agree that no on-board rest credit should be given for less than five hours of flight. Many scientists have proven that a 45-minute nap is extremely useful in fatigue mitigation. *See* Appx. F, Numbers 16 & 26. This particular question appears to be based upon scheduled operations, in which missions cross airports with crew change opportunities not less than every three mission segments. That is not the case for non-scheduled operations.

b. Does it matter if each segment provides an opportunity for some rest?

No. What matters is that the rest opportunity in flight, on the ground during split duty, and in required rest periods provide fatigue mitigation. In non-scheduled operations, it is extremely important that short last segments be permitted to complete a multiple segment operation and/or to reposition the crew and aircraft.

16. Should flight time be limited to 16 hours maximum within an FDP, regardless of the number of flightcrew members aboard the aircraft, unless a carrier has an approved FRMS?

No, as noted above, flight time should not be limited. The pre- and post-flight duties and the flow of operations over more than one segment will limit flight time within any reasonable FDP.

17. **Should some level of credit be given for in-flight rest in a coach seat? If so, what level of credit should be allowed? Please provide supporting data.**

   a. **Should some level of credit be given for in-flight rest in a coach seat?**

Yes. A coach seat should be included in the definition of a Class 3 rest facility. The combination of time off task, ability to exercise, and the opportunity to nap mitigates fatigue, and use of a coach seat is entirely appropriate in prescriptive regulations. The TNO study admitted that it gave no credit to a coach seat only because no scientific studies existed to support any position, and it assumed that any sleep obtained would be minimal. That assumption has been refuted by other scientists. Furthermore, the FAA places too much emphasis on that study. On the other hand, Dr. Hursh states that his models value "sleep in a coach seat at approximately 50 percent of the value of normal sleep." *See* Appx. F, No. 17, p.260. As is well known, the benefits of napping in the cockpit have also been deemed dramatic in fatigue mitigation by the NASA study presented in the ARC. NASA stated that a 40 minute cockpit nap, including in jump seat, with a 20 minute recovery resulted in increased alertness for a minimum of 90 minutes of the flight. *See id.*, No. 26. The Proposed Rule should not ignore the existing science and give zero value for a coach seat. NACA strongly recommends that FAA accept Dr. Hursh's position and grant 50% credit for a rest in a coach seat for a 4-pilot crew. For a 3-pilot crew, FAA must grant at least a 30% credit for rest in a coach seat or napping in the cockpit for non-scheduled operations. This should not be left to an individual carrier's FRMS. However, additional mitigations should be encouraged in individual carrier's FRMS. In addition to the in-flight rest opportunity, NACA recommends that, where this coach seat rest is required, non-scheduled members should extend the post-mission rest period to a minimum of 12 hours.

   b. **If so, what level of credit should be allowed?**

As explained above, 50% credit should be given to rest in a coach seat. As a minimum, grant 50% for a 4-pilot crew and up to 30% credit for one pilot augmentation (3-pilot crew) over the appropriate FDP limits.

   c. **Please provide supporting data.**

See the scientific references in response to question 16.a., above. *See* further supporting science in the comments on § 117.19 in Appendix B. There are no known accidents in augmented operations that are fatigue related. Furthermore, more than 50 years of current, safe operations prove this concept is safe. After all, all scientific theories must be put to extensive testing. Millions of flights are the proof.

18. Is there any reason to prohibit augmentation on domestic flights assuming the flight meets the required in-flight rest periods proposed today?

No. The FAA offers no scientific basis for limiting augmentation to international operations. Any such claim would seem to be based upon the argument "why augment when you can put a fresh crew on board at the next scheduled station?" The Proposed Rule must also accommodate non-scheduled operations worldwide. Proper augmentation, limits on FDP and appropriate rest periods will mitigate fatigue.

19. Are the proposed required rest periods appropriate?

In the context of the other questions in this area, NACA assumes this question pertains to the proposed in-flight rest periods allowed for various in-flight rest facilities or seats. NACA is opposed to the FAA's proposed structure. As noted in response to question 15 above, credit must be given for less than 5-hour mission segments and more credit must be provided for the various rest seat configurations. *See also* Appendix B.

If this question pertains to the 9 hours in a suitable accommodation for "rest period" between FDPs, NACA agrees that is a minimum. In fact, NACA proposes added rest in some circumstances. See Appendix A.

20. Should credit be allowed if a flightcrew member is not type-rated and qualified as a PIC or SIC?

Yes. In particular, NACA supports providing credit for the Flight Engineer as a third safety team member on three-position aircraft. *See* comments on § 117.15 in Appendix B. Decades of operations with two pilots and one flight engineer have proven that the crewmember not qualified to land the aircraft adds significant added safety, in general, and also provides an added safety monitor to permit one pilot to have time off task, time out of the seat at cruise for exercise, and other fatigue mitigation. Furthermore, these crew pairings are now almost exclusively used in international operations on missions of three segments maximum. Thus, where a tech stop is made, there is added fatigue mitigation opportunity on the ground, as noted in split duty circumstances below.

(2) Split Duty Rest

21. Please comment on whether a single occupancy rest facility provides a better opportunity for sleep or a better quality of rest than a multiple occupancy facility such as a multi-bed crew sleeping facility or multi-bed living quarters. Please provide supporting data.

NACA assumes this question addresses an actual sleep opportunity in a ground-based facility at a technical stop and as a "split duty" rest. NACA does not agree that a single occupancy rest facility is required to mitigate fatigue in split duty rest on the ground during a single FDP, and we do not agree with the 4-hour minimum requirement set forth in proposed section 117.17. The requirements for this facility should be the best available, and the credit should not be less than the concepts of a Class 1, Class 2, and Class 3 rest facility. This fatigue-mitigating, restorative rest opportunity must be maximized for single and/or augmented crews and in the best available rest facility. In fact, this 4-hour limitation defies the FAA's statement in the preamble of the NPRM (n.31) that, over time, 4 hours of split sleep may result in cumulative fatigue. Furthermore, the science shows that the split sleep can be restorative at much smaller periods and not interfere with the next major sleep opportunity during the post-FDP required rest period. As stated above, science has repeatedly shown that restorative rest is gained in as little as 45 minutes off task when it includes an ideal nap of approximately 20 – 30 minutes. The FAA must use available science in arriving at the Proposed Rule. Because science shows that a 45 minute rest provides that restorative rest, the only question is how much credit to award. The answer is the same credit as a Class 1 rest facility. NACA believes that 90 minutes of ground time provides sufficient time to safely provide 45 minutes for crew members at a rest facility, including a 20 – 30-minute nap, and to safely have the crew arrive back in the aircraft 30 minutes prior to departure.

Where the discussion pertains to a "rest period" as defined in proposed section 117.3 and as prescribed in proposed section117.21, NACA agrees a single occupancy rest facility provides a better opportunity for sleep than does a multiple occupancy facility. NACA also agrees that adequate rest sleep is the principle means of fatigue mitigation. For that reason, for rest periods prior to and subsequent to flight duty periods away from home station, NACA's members provide single occupancy rest facilities for flight crewmembers.

H. <u>Consecutive Nighttime Flight Duty Periods</u>

22. Should there be any restriction on consecutive nighttime operations? If not, why?

There should be no restriction on consecutive nighttime operations. This appears to be an industrial issue, not a science-based prescription for fatigue mitigation. Alaska and other northern hemisphere home bases and destinations are immersed in darkness for most of the late fall and winter months. So, which nighttime is in discussion? NACA's Proposal appropriately accounts for nighttime operations by limiting FDPs for flying that encounters the WOCL, further decreasing applicable FDP limits for number of segments, further decreasing applicable FDP limits for non-acclimated crewmembers, and applying the 168-hour look-back provision limiting total FDP. *See* Appendix A. In the ARC, scientists noted that the repeated infringement of duty time on the opportunity to sleep results in accumulated sleep debt and that the operative factor in recovery from cumulative fatigue is sleep. In the short term, it does not matter if the sleep is during the daytime. As long as the crew member is given sufficient opportunity to sleep, there should not be any limit on consecutive night operations.

23. **If the nighttime sleep opportunity is less than that contemplated under the split duty provisions of this notice, should a carrier be allowed to assign crew pairing sets in excess of three consecutive nights? Why or why not?**

    Yes, the carrier must be allowed to assign crew pairing sets in excess of three consecutive nights. This may be an industrial issue. Experienced pilots have stated that the most difficult crew pairing in a 5-consecutive night pairing is the first night.

24. **If the nighttime sleep opportunity meets the split duty provisions of this notice, should the carrier be allowed to extend the flight duty period as well as the number of consecutive nighttime flight duty periods? Why or why not?**

    Yes. See the responses to questions 22 and 23 above.

25. **Should a fourth night of consecutive nighttime duty be permitted if the flightcrew member is provided a 14-hour rest period between nights three and four?**

    Yes, it should be permitted. NACA agrees with the suggested 14-hour rest period as one mitigation, but that is not the only fatigue mitigation option. See the responses to questions 22, 23, and 24 above. A fourth consecutive night of operations should be allowed as long as normal minimum rest requirements are met. In Appendix B, NACA proposes 10 hour from crew release to show time for acclimated crews and 12 hours for unacclimated crews. No additional rest should be required.

I. Reserve Duty

26. **Please comment on whether a 16 maximum hour FDP for long call reserve is appropriate when the maximum FDP for a line holding flightcrew member is 13 hours.**

    NACA sees no connection between long call reserve and the FDP for a line-holding flightcrew member. The preamble and the definitions of “duty” and “long call reserve” in the NPRM make clear that long call reserve is not duty. Thus, it cannot be compared to FDPs, which are included in duty. While long call reserve can be assigned at home, home base or at en route stations, the phrase “16 hour FDP for long call reserve” in this question appears to be misplaced, at best.

27. Please comment on whether the proposed maximum extended FDP of 22 hours for an augmented flightcrew member is appropriate. If not, please provide an alternative maximum FDP.

Yes, NACA agrees that the FDP should be extended to 22 hours for the combination of short-call reserve and FDP with an augmented crew. As noted in the NPRM, there will be on-board rest, and in this case of 22 hours, there must be a Class 1 rest facility.

28. Please comment on whether a certificate holder should receive credit for not calling a flightcrew member during the WOCL while on reserve.

Yes. It can be reasonably assumed that the flight crewmember on reserve is sleeping during the WOCL or that his/her sleep reservoir is full. Thus, credit for sleep during the WOCL is supported by science. NACA does not agree that there should only be half credit for not calling during the WOCL – full credit should be given.

29. Should minimum required rest while on reserve status be greater than the amount of rest required for a line-holding flightcrew member? If so, please provide supporting data, if not please provide rationale.

No. This very concept is illogical in light of established limits on total FDP. Furthermore, because the crewmember in short call reserve should be conserving energy and mitigating fatigue, NACA believes that, where the crewmember is not called out for an FDP, the short call reserve availability cycle should be 16 hours on/8 hours off (i.e., 8 hours rest added to what has already been a fatigue mitigating day). After all, where a second day of short-call reserve is scheduled, the crew member remains in the same theater, in the same rest facility, and 8 hours of sleep is all that science says is required.

30. Please comment on the level of complexity on the proposed reserve system.

The proposed reserve system is highly complex, both in the prescribed limits and in the novelty of any regulated regime for reserve. Furthermore, the proposed reserve system appears to be built specifically for scheduled operations. While U.S. certificate holders and their crewmembers have decades of experience with long and short call reserve and airport standby, it has never been a part of the regulations. Availability of reserve crewmembers is one of the two most significant issues in this proposal for non-scheduled operations. Without significant change, it is a "show-stopper" for world-wide non-scheduled air transportation which must, in most cases, must be operated with augmented crews, or must be operated with only one reserve crew available. See NACA's specific comments on proposed section 117.21 in Appendix B.

J. Cumulative Duty Periods

31. The FAA seeks input on the appropriate cumulative limits to place on duty, flight duty periods and flight time. Is there a need for all the proposed limits? Should there be more limits (e.g., biweekly, or quarterly limits)?

NACA supports the concept of cumulative limits for 168 hours and 28 days. Combined with a scientifically-constructed FDP based upon number of crewmembers, time of day and number of mission segments, 168-hour and 28-day cumulative limits should suffice to permit a crewmember to either avoid fatigue or to mitigate fatigue. Furthermore, the required FRMP will audit this situation. Thus, NACA sees no scientific basis for added cumulative limits. There should be no daily, monthly, annual or any other limits on flight time in light of a regulation limiting duty, FDPs and rest requirements.

32. The FAA also asks for comments on measuring limits on an hourly rather than daily or monthly basis. Does this approach make sense for some time periods but not for others?

See answer to question 31 above.

K. Rest Requirements

(1) Pre-Flight Duty Period Rest

33. If transportation is not considered part of the mandatory rest period, is there a need for a longer rest period for international flights?

NACA recommends a minimum of 10 hours from crew release-to-show time for the next FDP for an acclimated crew and 12 hours release to show for non-acclimated crews. Any rationale and consideration for longer rest periods internationally must be justified scientifically.

(2) Cumulative Rest Requirements

NACA recommends that 30 hours uninterrupted rest be provided to all crewmembers in each 168-hour look back period. That look back is applied at the report time for each FDP.

L. Fatigue Risk Management Systems

34. Would some elements of an FRMS, such as an incident report system, be better addressed through a voluntary disclosure program than through a regulatory mandate?

NACA has strongly supported a FRMS in its ARC comments. The FRMP requires reporting and monitoring of fatigue. NACA also does not object to any crewmember or certificate holder entering into a voluntary reporting program with the FAA, NTSB or other authority. A voluntary reporting program, on the other hand, faces the same challenges of other voluntary programs (e.g., ASRS). That challenge is primarily one of retaining non-attribution standards and agreed-upon amnesty for revealing any detail that may have been a regulatory infraction. On the other hand, amnesty cannot always be granted. Thus, NACA recommends that the incident reporting system be internal to the certificate holding company, not part of an FAA regulated system. The purpose of the incident reporting system is to add data to the decision making process of fatigue management, modifications of the FRMP, if necessary, but provides the certificate holder with prerogatives where violations of policy or safety occur.

M. Commuting

The FAA offers no questions on commuting. However, NACA believes commuting is a significant issue in fatigue and its mitigation. As carriers develop training programs for FRMP and for this regulation, commuting must be addressed. This will place significant pressure on labor – management relations.

N. Exception for Emergency and Government Sponsored Operations

35. Are there other types of operations that should be excepted from the general requirements of the proposal? If so, what are they, and why do they need to be accommodated absent an FRMS?

Yes. If the FAA's Proposed Rule is adopted, all non-scheduled operations must be deemed exceptions to the general requirements of the proposal. The FAA fails to offer alternative proposals anywhere in the docket and summarily dismisses NACA's ARC proposal. Assuming the FAA accepts NACA's Proposal, NACA recommends that all short notice "emergency operations" (hurricane evacuation, fire fighting, earthquake response, WMD response, prisoner movement, etc.) should be excepted either under proposed section 117.31 or through traditional FAA SFARs granting relief.

APPENDIX D

to

Comments of National Air Carrier Association

(November 15, 2010)

Docket FAA-2009-1093

Evaluation of the FAA's Benefits Calculations in the Regulatory Impact Analysis

by David D. Smith, Ph.D.

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November 10, 2010

Critique of the Benefit Analysis
In the Regulatory Impact Analysis
Flightcrew Member Duty and Rest Requirements, Part 117
Office of Aviation Policy and Plans
Issued September 3, 2010

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Economists Incorporated

Benefits of the Proposed Rule are Less Than the Costs.

The FAA estimates total benefits from the proposed policy to be $659 million over 10 years, or a present discounted value of $463.80 million. (RIA, p. 2) The FAA also estimates the total costs of the proposed rule over 10 years to be $1.25 billion, or $804 million at present discounted value. (RIA, p. 2) The $659 million figure is unsupported in its own right and based upon modeling that is unsubstantiated as to non-scheduled carriers. Assuming the foundation for that value is established by empirical data and the modeling is relevant, the FAA has tried to justify a doubling of the benefits number to a level approximately equal to the costs, but there is inadequate empirical support for including these alleged additional benefits.

The FAA Has Tried Four Ways to Justify a Doubling of the Benefits Number.

These four ways are:

1. Doubling the Value of a Statistical Life ("VSL");
2. Including "damage on the ground";
3. Including accident "mitigation"; and
4. Assigning fatigue as a cause of accidents even when there is no evidence.

Each of these four attempts to justify a doubling of the benefits number is addressed below.

1. There is No Evidence Supporting a Value of a Statistical Life ("VSL") of $12.6 Million.

The RIA says that 2009 guidance from DOT, consistent with OMB Circular A-4, suggests the VSL is $6 million. (RIA, p. 71) The RIA says that recent literature is consistent with a VSL value of $8.4 million. (RIA, p. 71) The RIA then goes on to state, in what can only be described as a non sequitur, that "[i]f the value of an averted fatality were increased to $12.6 million, the present value of the benefits would equal the present value of compliance costs." (RIA, p. 2) This is not a relevant consideration. The value of an averted fatality is independent of and unrelated to the benefit-cost analysis. The RIA provides no evidence whatsoever showing that the much larger figure, $12.6 million, is the appropriate VSL. With a VSL of $6 million or even $8.4 million, the proposed policy fails the benefit-cost test.

2. There is no Evidence Indicating How Much "Damage on the Ground" is Attributable to Flightcrew Fatigue.

There are attempts in the analysis to boost the benefits number by including benefits for "preventing minor aircraft damage on the ground and the value of well rested pilots as accident preventors and mitigators." These additional benefits, however, are speculative and have not been substantiated.

The FAA says that minor aircraft and equipment damage on the ramp "may involve much larger dollar losses than the few fatal accidents that occur." (RIA, p. 69, *emphasis added*) One estimate puts the cost of ground accidents at $5 billion per year worldwide, and at least $3 billion in the United States. (RIA, p. 69) Even assuming that these numbers are correct, there is no evidence indicating how much of this damage is attributable to flightcrew fatigue. (RIA, p. 69)

The RIA concludes that, "[d]ue to data limitations, the FAA was unable to estimate the cumulative effect of preventing minor aircraft damage on the ground, but if the rule were to reduce damage by about $600 million over 10 years ($340 million present value) it would break even in terms of net benefits. (RIA, p. 120, *emphasis added*) This statement may be tautologically true, but there is no evidence supporting the $600 million figure and it should be ignored.

3. Considering Accident "Mitigation" Can Exaggerate Benefits.

The FAA says that "[w]hen an [aircraft] accident occurs, it is generally the result of a long chain of multiple failures. The flightcrew in the cockpit is generally the last opportunity to break the chain and prevent an accident." (RIA, p. 70) The FAA refers to stepping in to "break the chain" and prevent an accident as "mitigation," and says that fatigue reduces the ability of the flightcrew to perform mitigation. The FAA also says that "it is not possible to estimate the impact of increased problem solving capability from fewer fatigued pilots. It is, however, real and significant." (RIA, p. 71) Again this may be true as tautological statement, but is of no value in an economic analysis.

The FAA can only take credit for such "mitigation" (a rested crew) and count that "mitigation" as a benefit derived from the proposed rule if failure to "break the chain" is the result of that pilot being fatigued. Without data supporting that the break in the chain is due to the pilot being rested, FAA cannot include credit for such "mitigation" in its benefit analysis, and benefits are exaggerated.

4. There is No Justification for Concluding That Accidents Caused by Flightcrew Fatigue are 4 to 6 Times Larger than the Evidence Shows.

The FAA also inflates the benefits of the proposed rule by assuming the rule would prevent an additional portion of pilot error accidents even though in the past these accidents were not known to have been caused by fatigue.

The FAA adds 77.2 accidents to the known 13 for passenger flights (over a period of 20 years) for a total over 90. (RIA, p. 50) They also add 22.6 accidents to the known 5.8 figure for cargo flights (over a period of 20 years) for a total over 28. (RIA, p. 53)

To come up with these large estimates, the FAA started with the figures for accidents known to be caused by fatigue as the lower bounds for its estimates of future accidents.[1] (RIA, p. 55) It is difficult, without empirical data derived from these accidents that shows fatigue was involved, to justify upper bounds that are 4 to 6 times larger than these figures (22.6 relative to 5.8 and 77.2 relative to 13), since these estimates are based on sweeping in accidents not known to be caused by fatigue. It also assumes that the agency determining the cause of the accident as not including fatigue was in error.

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[1] The FAA determined that pilot fatigue was present in 13 of the 33 passenger accidents (13/33=39.4%) for which it had enough information in the accident report to make a judgment about the presence or absence of pilot fatigue. (RIA, p. 50) The comparable figures for cargo accidents are 5.8 out of 10 accidents (5.8/10=58.0%). (RIA, p. 53) The FAA then assumed that 39.4% of the 196 passenger accidents for which there was insufficient information to identify the cause of the accident were also caused by pilot fatigue. (39.4% of 196 is 77.2.) (RIA, p. 50) Similarly, it assumed that 58.0% of the 39 cargo accidents for which there was insufficient information to identify the cause of the accident were caused by pilot fatigue. (58.0% of 39 is 22.6) (RIA, p. 53)

The Probability of Benefits Has Been Misinterpreted.

The FAA says that there is only about a 7 percent probability that the benefits of the proposed policy would exceed the costs in nominal terms, or a 10 percent probability that the benefits would exceed costs in discounted terms. (RIA, p. 2)

This is a misleading and irrelevant statement. A 10 percent probability that the benefits would exceed costs also means that there is a 90 percent probability that they would not. Simulation models create a distribution of possible outcomes. Based on the particular assumptions underlying the model, the FAA's particular simulation model predicted results represented by the graphs on pages 44 and 48 of the RIA. These distributions show that there is a benefit number associated with every probability (be it 10 percent, 7 percent, or something else).[2] But this does not mean that any of the benefit numbers along the horizontal axis is equally valid for comparing with costs in the benefit-cost analysis.[3]

The best estimate of the costs of the proposed policy is a mean of possible cost estimates. For an apples-to-apples comparison in the benefit-cost analysis, this mean costs number should be compared to the mean benefits estimate. According to the FAA's own assumptions, the model's best estimate of benefits from the proposed policy is $659.4 million ($463.80 million in present value). This figure, although based upon invalid assumptions, is the mean estimate. Higher and lower benefits are possible than those associated with the mean estimate, but it is the expected value of the benefits (the mean benefits) that should be compared to the expected value of the costs (the mean costs).

The FAA Assumes That the Proposed Rule Would Eliminate All Accidents Attributable to Lack of Rest Before a Flight.

Another error in the RIA is the assumption that if the new rule is adopted the number of airplane accidents attributable to lack of rest before a flight will drop to

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[2] For example, the way to read the graph on p. 44 is that 10 percent of the black area under the graph is to the right of $1.25 million on the horizontal axis. The total black area under the graph represents 100 percent of the possible estimates from the simulation model.

[3] An example might help to clarify this point. Consider a baseball player with a batting average of .250. This is the mean of his historical hitting success. If asked to predict this player's future hitting success, we would use this mean, .250, as the best estimator. This does not mean that we think he will definitely bat .250 in the future, but this is our best estimate since it is the mean of his past performances. Based on historical data, we may also estimate that there is a 10 percent chance that this player will get 8 hits out of the next 10 times at bat. If this is the case, it would be accurate to say that going forward he has a 10 percent chance of batting .800, but that does not make .800 the best estimate of his future batting success. That would still be .250.

zero. The RIA says, "The new requirements of this rulemaking, including increased training, would prevent these [five] accidents [identified as caused by fatigued flight crews] from happening in the future." (RIA, p. 17) This claim is unsupportable and untrue. No rule can guarantee zero fatigue-related accidents. (RIA, p. 17) Indeed, later in the RIA the FAA admits, "[F]atigue is rarely a primary or sole cause of an accident, and therefore this rule, if adopted, is not likely to prevent all future accidents that include fatigue as a factor." (RIA, p. 65)

The FAA Simulation Model Has Not Been Shown to be Applicable to Unscheduled Airline Operators.

When analyzing the role of duty time limits on flight safety, the FAA used data from three large legacy passenger carriers and two large cargo carriers. (RIA, p. 18) Because of the differences between scheduled and unscheduled flight operations (primarily scheduled vs. unscheduled/charter), it is not clear that the FAA model has any relevance whatsoever for predicting the benefits of its proposed policy on unscheduled flight operations. Apparently the FAA has not tested how well the model represents the unscheduled flight part of the industry.

Without examining the FAA's model in detail, it is not possible to know in what other ways it does not take into account characteristics that are specific to unscheduled airline operations. The FAA uses a "one-size-fits-all" model where all the sizes are not even known.

NACA represents a diverse group of Part 121 air carriers, providing non-scheduled and scheduled passenger and cargo services. NACA members also provide long-haul services, and they provide significant lift capacity for troop and cargo movements in support of U.S. Department of Defense missions around the world. In addition, they provide flights for humanitarian relief operations. These different ways of operating likely cause NACA members to have different cost structures than the legacy passenger carriers and cargo carriers on which the FAA simulation model was built. It is important to analyze data for unscheduled flights to determine if such cost differences between them and legacy passenger/cargo carriers do exist. If the model does not test for these differences and then take them into account where appropriate, any conclusions drawn from the model and applied to the NACA carriers are unsupported.

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Economist, Economic Litigation Section, Antitrust Division, Department of Justice, 1979 – 1988

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Research Assistant, Department of Economics, University of Michigan, Summer 1976

Research Assistant, Institute for Social Research, University of Michigan, 1975 – 1976

Professional Awards

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Department of Justice Special Achievement Award for Meritorious Service, 1986

Department of Justice Special Achievement Award for Meritorious Service, 1985

Professional Associations

American Economic Association

American Bar Association

APPENDIX E

to

Comments of National Air Carrier Association

(November 15, 2010)

Docket FAA-2009-1093

Assumptions in FAA's Cost Analysis in its Regulatory Impact Analysis

FEDERAL AVIATION ADMINISTRATION
FLIGHTCREW MEMBER DUTY AND REST REQUIREMENTS

Outline of the FAA's Assumptions in the RIA's Cost Analysis

I. **Flight Operations**

A. Crew Scheduling

1. Overall Assumption: The crew scheduling component (resource cost only) of flight operations costs would total $1,366.7 million (nominal cost) / $854.2 million (present value cost). RIA, p.75.

- Overall Underlying Data:
  - Six air carriers (including three large legacy passenger carriers and two large cargo carriers) provided actual crew schedules consisting of one spring month in 2009 and one summer month in 2009 of actual work history for each flight crew member employed by each carrier ("*actual crew schedule data*"). The FAA used that raw data to construct *baseline summary data* for each carrier. The total numbers of duty periods, duty hours, flight hours, and flight segments were summarized, and the summary data was divided by the number of flight crew members in each data set to produce monthly averages. RIA, pp.75-76.
  - The FAA examined the flight duty, rest, and flight time limits in the proposed rule by applying those limits to the *actual crew schedule data*. A computer program applied those limits to the data and modified the data to comply with the limits, resulting in modified flight crew member work histories. These modified work histories were used to construct *modified summary data* for each of the six carriers, which was divided by the number of flight crew members in each data set to produce modified monthly averages. RIA, p.76.
  - The FAA compared the modified average number of flight hours per flight crew member to the baseline average for each of the six carriers, with the difference representing the average number of flight hours per flight crew member that were not in compliance with the flight duty, rest, and flight time limits in the proposed rule ("*average noncompliant hours*"). The *average noncompliant hours* is an initial estimate of the costs of complying with the limits in the proposed rule. RIA, pp.77-78.
- Overall Reference to Nonscheduled Operators: None. The FAA did not use any data from supplemental carriers in its calculations of crew scheduling costs.

a. Assumption: The FAA used the *actual crew schedule data* and its modifications thereof of six (non-supplemental) carriers to produce estimated crew scheduling costs for the entire air transport industry. RIA, p.78.

  - Underlying Data: The FAA used the raw data provided by six carriers (including three large legacy passenger carriers and two cargo carriers) and its modifications thereof and extrapolated that data to the entire industry. None of the six carriers that provided raw data were supplemental carriers. The FAA did not provide the underlying data used for its calculations.

  - Reference to Nonscheduled Operators: None.

b. Assumption: For purposes of cost estimation, the raw data provided by large cargo carriers to the FAA was used as the crew scheduling costs for charter passenger carriers under the proposed rule.

  - Underlying Data: Small passenger, small cargo, and charter passenger carriers (three of seven distinct categories of Part 121 air carriers, based on size of the aircraft type with the most block hours in 2008 and operating characteristics) were not represented in the raw data provided by the six carriers to the FAA. As a result, for purposes of cost estimation, small passenger, small cargo, and charter passenger carriers were each assigned to a comparison group ("*relevant comparison group*"), described as "the industry group that most closely resembles the unrepresented industry group." RIA, pp.80-81. The FAA provided no information on how it determined that the large cargo industry group most closely represents charter passenger carriers.
  - Reference to Nonscheduled Operators: None.

c. Assumption: The number of noncompliant flight hours for each air carrier in the air transport industry may be calculated using the *average noncompliant hours* for each carrier's *relevant comparison group*. RIA, p.81.

  - Underlying Data: To calculate the crew scheduling costs of the proposed rule, the total number of noncompliant flight hours for each air carrier in the air transport industry was calculated by multiplying the number of flight crew members employed by the carrier by the *average noncompliant hours* for the carrier's *relevant comparison group*. RIA, p.81. Thus, for charter passenger carriers, the FAA took its initial assumption that charter passenger carriers are similar to large cargo carriers and then relied on the *average noncompliant hours* for large cargo carriers to calculate the total estimated number of noncompliant flight hours for each charter passenger carrier. The FAA did not provide the foundation data for its calculation.
  - Reference to Nonscheduled Operators: None.

d. Assumption: The average hourly salary per flight crew member for each charter passenger carrier is $92. RIA, p.82.

  - Underlying Data: After the total number of noncompliant flight hours was calculated for each carrier, costs were calculated based on the average hourly salary for each flight crew member for each carrier by using salary data (annual salary and estimated credit hours) in a 2006 report by AIR, Inc. If salary data was unavailable for a carrier, the average hourly salary per flight crew member for that carrier's industry group was used as a proxy. The average hourly salaries were updated to 2009 values using the Air Transport Association Passenger Airline Cost Index ("ATA Index"). RIA, pp.81-82.

        - <u>Reference to Nonscheduled Operators</u>: The FAA did not provide the data in the 2006 AIR, Inc. that it used to calculate the average hourly salary per flight crew member for charter passenger carriers.

2. <u>Overall Assumption</u>: The total unadjusted additional annual crew scheduling costs for all air carriers from the proposed rule totals $3,383,400 (nominal cost) / $2,075,600 (present value cost) for 2013-2022. RIA, p.83.

- <u>Overall Underlying Data</u>: The average hourly salary per flight crew member for each carrier was multiplied by the noncompliant flight hours for each carrier to determine an estimated salary cost for each carrier, which represents the additional crew scheduling salary cost for each carrier to comply with the limits in the proposed rule ("*additional crew scheduling salary cost*"). The FAA then calculated the hotel and per-diem additional costs for each carrier, using proportions for salary, hotel, and per diem costs that were provided by one carrier as its own estimated additional crew scheduling costs to comply with one alternative to the proposed rule. The individual carrier hotel and per-diem costs were summarized based on the seven industry groups and added to each carrier's *additional crew scheduling salary cost* to determine each carrier's unadjusted additional annual crew scheduling costs, and each carrier's total costs were combined to determine the total unadjusted crew scheduling costs (" *total unadjusted crew scheduling costs*") for the industry. RIA, pp.82-83. It is unclear what carrier provided the allocation of total crew scheduling costs to salary, hotel, and per-diem categories that the FAA used.
- <u>Overall Reference to Nonscheduled Operators</u>: None.

a. <u>Assumption</u>: The proportions for salary, hotel, and per-diem costs provided by one unnamed carrier may be used to estimate hotel and per-diem costs for other carriers and other scenarios. RIA, p.83.

    - <u>Underlying Data</u>: None.
    - <u>Reference to Nonscheduled Operators</u>: None.

3. <u>Overall Assumption</u>: The crew scheduling costs calculated using the methodology described above substantially overestimate the probable actual crew scheduling costs of the proposed rule. RIA, p.85.

- <u>Overall Underlying Data</u>: "[M]any of the flight segments that are eliminated for non-compliance with the proposed rule are only non-compliant by small amounts of time. Approximately 86 percent of the eliminated flights are due to non-compliance with duty limits, rather than flight or rest limits. . . . Nearly 40 percent of flights were eliminated due to their duty period exceeding the maximum allowable duty time by less than 60 minutes." RIA, pp.83-84. The FAA believes that this result would not be realistic under the proposed rule because "[m]ost airlines employ computer programs to optimize crew schedules – to minimize the number of crew hours, and hotel and per diem costs it takes to fly a given flight schedule within imposed constraints." RIA, p.84. The FAA developed a methodology, discussed below, to adjust its estimated *total unadjusted crew scheduling costs* to a more realistic representation of costs under the proposed rule. RIA, p.85. The FAA did not identify what portion of the eliminated flights under the FAA's model consisted of supplemental operations.

- Overall Reference to Nonscheduled Operators: None.

a. Assumption: The *total unadjusted crew scheduling costs* may be discounted by 25 percent, representing the savings expected from the computer models used to build schedules (as flight schedules will be rearranged into new trips that meet the limits of the proposed rule) ("*short term optimization*"). The *total unadjusted crew scheduling costs* after *short term optimization* are $2,537,500 (nominal cost) / $1,556,700 (present value cost) for 2013-2022. RIA, p.85.

  - Underlying Data: "FAA selected a factor of 25 percent because it approximates the difference in costs submitted by a sample of carriers to FAA when they evaluated an alternative to the proposed rule, using their computer models, to the costs estimated by the FAA using the same cost estimation process described previously." RIA, p.85. The FAA did not provide any foundation for the 25% factor it used as applied to supplemental carriers. It did not identify which types of carriers submitted cost difference data to the FAA and also did not address whether there are any differences between the scenario for which the costs were estimated (the "alternative to the proposed rule") and the proposed rule.[1]
  - Reference to Nonscheduled Operators: None.

b. Assumption: "Typically, industry will experience from 10 to 40 percent savings from reoptimizing in this fashion." RIA, p.85.

  - Underlying Data: None.
  - Reference to Nonscheduled Operators: None.

c. Assumption: Of the additional salary costs to carriers to comply with the proposed rule, the initial share of that additional pay to existing crews will be 41% and the initial share to new hires will be 48%. RIA, p.87.

  - Underlying Data: The FAA used those initial share percentages because they "are identical to those provided by one carrier that submitted a detailed cost estimate to FAA of an alternative to the proposed rule." RIA, p.87. The FAA did not identify the carrier that provided the initial share percentages used by the FAA in its estimate. The FAA did not provide any foundation for applying these percentages to supplemental carriers.
  - Reference to Nonscheduled Operators: None.

d. Assumption: Over time, the share of pay to existing flight crew members will increase while the share of pay to new hires will decrease, "because carriers will continue to schedule crews ever more efficiently." RIA, p.87.

  - Underlying Data: None.
  - Reference to Nonscheduled Operators: None.

e. Assumption: From 2013-2022, the share of additional salary costs to existing crews will rise from 41% to 59%, and the share to new hires will decrease from 48% to 30%. Each will increase/decrease by 2% per year. RIA, p.87.

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[1] If the alternative is significantly different from the proposed rule, the FAA's 25 percent discount may not be appropriate to estimate *short term optimization* under the proposed rule.

    - Underlying Data: None specified. The FAA stated these changes will occur "because carriers will continue to schedule crews ever more efficiently," RIA p.87, but it did not explain why it chose to adjust those costs by 2% per year.
    - Reference to Nonscheduled Operators: None.

f. Assumption: The *total crew scheduling costs* should be adjusted for long term optimization factors representing transfer and resource costs such as "changes to crew bases, flight schedules, and other similar changes that will be implemented over a number of years. These also include potential adjustments to contracts between pilots and airlines that govern pay and working conditions [("*long term optimization*")]." RIA, pp.87-88.

    - Underlying Data: Unclear. The FAA set forth two charts (Tables 15 & 16) with its estimated *long term optimization* of additional pay to existing crews and pay to new hires over ten years (2013-2022). In its *long term optimization* of additional pay to existing crews, the FAA started with (i) an optimization factor of 60% in 2013, which decreased to 40% in 2014 and then 20% from 2015 onward; (ii) a transfer cost of 67% in 2013, which decreased to 50% in 2014 and then 0% from 2015 onward; and (iii) a resource cost of 33% in 2013, which increased to 50% in 2014 and then 100% from 2015 onward. In its *long term optimization* of pay to new hires, the FAA started with (i) an optimization factor of 95% in 2013, which decreased to 90% in 2014 and then 80% from 2015 onward; (ii) a transfer cost of 0% at all times; and (iii) a resource cost of 100% at all times. The FAA's only explanation of these changes was that "[o]ver the longer term, we expect that carriers will be able to improve scheduling efficiency of existing crew members. In the case of new pilots, there is less of an opportunity to improve scheduling efficiency." RIA, pp.88-89. The FAA did not provide the foundation for its calculation. The FAA did not provide any basis for applying these percentages to supplemental carriers.
    - Reference to Nonscheduled Operators: None.

B. Additional Pilot to Supplement Flight Engineer

1. Overall Assumption: The annual cost of adding a pilot to supplement a flight engineer on augmented flights for charter passenger carriers is $300,000. RIA, p.92.

- Overall Underlying Data: Using the crew schedule data provided by six (non-supplemental) carriers, the FAA identified the flights affected by the proposed rule change (flights on aircraft types utilizing a flight engineer (B727 & B747) which exceed 8 hours with a two-pilot flight crew), which were all large cargo flights. The number of flight hours associated with those flights was annualized and then divided by the number of flight engineers for the relevant carriers, resulting in an average of 29.1 flight hours affected by the rule change per flight engineer. That average number was then extrapolated to the entire air transport industry using the number of flight engineers listed on each carrier's Operating Certificate. The 29.1 average number was multiplied by the number of flight engineers listed on each carrier's Operating Certificate, and that number was then multiplied by the average hourly pilot salary for the carrier's industry group to determine the total estimated cost of this aspect of the proposed rule. RIA, pp.91-92.

- Overall Reference to Nonscheduled Operators: None.

a. Assumption: The average number of flight hours affected per flight engineer for large cargo flights in the crew schedule data provided to the FAA can be extrapolated to the entire air transport industry. RIA, p.91.

  - Underlying Data: The FAA relied on crew schedule data provided by large cargo carriers from one month in spring 2009 and one month in summer 2009. The FAA did not explain why large cargo carriers are similar enough to charter passenger carriers to justify extrapolation of large cargo crew scheduling data for conclusions as to charter passenger crew scheduling costs.
  - Reference to Nonscheduled Operators: None.

b. Assumption: The number of flight hours for flight engineers at each carrier can be multiplied by the average hourly pilot salary for the carrier's industry group (here, charter passenger carriers) to determine the total estimated cost of this aspect of the proposed rule. RIA, p.91

  - Underlying Data: The FAA used the salary data in the 2006 AIR, Inc. report, updated to 2009 salary levels using the ATA Index. RIA, pp.81-82.
  - Reference to Nonscheduled Operators: None specified.

C. Computer Programming

1. Overall Assumption: Carriers will incur a total one-time cost in 2013 to upgrade their computer systems of $2.1-$5.6 million (nominal cost) / $1.7-$4.3 million (present value cost), with costs per carrier of $50,000-$250,000, depending on the number of flight crew members for each carrier has. RIA, p.94.

- Overall Underlying Data: The FAA took the number of flight crew members listed on each carrier's Operating Certificate and assigned each carrier to one of three groups based on that number (<250; 250-1,000; or >1,000). Costs were estimated based on the number of person-days required to complete the computer programming and a daily professional staff cost of $2,500. RIA, pp.93-94.
- Overall Reference to Nonscheduled Operators: None, although the FAA stated that it estimated the costs based on its number of flight crew members for each carrier, which would take into account the size of supplemental carriers.[2]

a. Assumption: A daily professional staff to complete the computer programming upgrade will cost $2,500. RIA, p.93.

  - Underlying Data: None.
  - Reference to Nonscheduled Operators: None.

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[2] The present value overall cost is less than the nominal cost in each category of carrier. See RIA, p.94.

D. Cost Savings from Reduced Reserves

1. Assumption: "[S]ick time accounts for five percent of total industry flightcrew member pay. The proposed rule is expected to reduce the use of sick time by five percent." RIA, p.95.
    - Underlying Data: None. The FAA stated that the proposed rule is expected to reduce fatigue and result in better-rested flight crew members, thereby reducing the use of sick time. The reduced use of sick time correspondingly reduces the use of reserve flight crew members to cover fatigue-induced sick leave. "While the precise share of current sick time attributable to fatigue is unknown, it is most likely greater than zero. Similarly, while the precise amount by which the proposed rule will reduce sick time is unknown, it is also most likely greater than zero." RIA, pp.94-95. The FAA did not explain why it chose five percent as the expected reduction in sick time from the proposed rule.
    - Reference to Nonscheduled Operators: None.

E. Cost Savings from Augmented Operations

1. Overall Assumption: The potential total cost savings to charter passenger carriers from the proposed rule's elimination of maximum flight time limits for augmented operations is $100,000. RIA, p.101.
    - Overall Underlying Data: The FAA used *actual crew scheduling data* from six carriers. The FAA admitted that "**[d]ue to the limited sample size, the FAA needed to make several assumptions and the resulting potential cost estimate is highly uncertain**." RIA, p.97.

    a. Assumption: Only flights lasting 12-14 hours that were conducted with four crew members were considered for potential cost savings. RIA, p.97.
        - Underlying Data: Flights of less than 12 hours were not considered because flag and supplemental carriers are allowed to operate flights of less than 12 hours with three flight crew members under existing limits. Flights of more than 14 hours were not considered because the maximum limit is 16 hours for augmented operations. RIA, p.97.
        - Reference to Nonscheduled Operators: None.

    b. Assumption: The two-hour difference between flights of 14 hours and flights of 16 hours reflects check-in and check-out before and after the flight.
        - Underlying Data: None. The FAA admitted that "[t]o the extent that actual check in/check out is greater than or less than the assumed two hours, this potential cost savings estimate may overestimate or underestimate the actual cost savings." RIA, p.97.
        - Reference to Nonscheduled Operators: None.

    c. Assumption: "[I]t is assumed that flightcrew member labor agreements will permit the carriers to reduce the number of flightcrew members from four to three." RIA, p.97.
        - Underlying Data: None. The FAA admitted that "[t]o the extent that labor agreements restrict the flexibility of carriers to reduce the number of flightcrew members on these flights, this potential cost savings estimate will overestimate the actual cost savings." RIA, p.97.

    - Reference to Nonscheduled Operators: None.

d. Assumption: "[I]t is assumed that the crew scheduling needs of carriers will permit them to reduce the number of flightcrew members from four to three." RIA, p.97.

    - Underlying Data: None. The FAA admitted that "[t]o the extent that carriers desire to operate a flight with four flightcrew members rather than three flightcrew members for operational or schedule reliability purposes, this potential cost savings estimate will overestimate the actual cost savings." RIA, pp.97-98.
    - Reference to Nonscheduled Operators: None.

e. Assumption: "[T]o extrapolate the potential cost savings of those carriers for which FAA had data to the entire US air transport industry, it was necessary to assume that the scheduling practices of other carriers were similar to the scheduling practices of those carriers for which FAA had data." RIA, p.98

    - Underlying Data: The FAA used *actual crew scheduling data* from four carriers (commercial passenger and large cargo) – the only carriers that operated 12-14 hour flights with four flight crew members. The FAA admitted that "[i]f the scheduling practices of the remainder of the US air transport industry materially differ from the scheduling practices of those carriers for which FAA had data, this estimate of potential cost savings may over- or underestimate the actual cost savings." RIA, p.98.
    - Reference to Nonscheduled Operators: None.

- Additional Underlying Data:
    - The FAA calculated the distribution of flight hours by flight duty period start hour and aircraft rest facility, which was then adjusted to conform to the 16-hour maximum flight duty period limit, resulting in a "realistic number of flight hours that could be reduced from four flightcrew members to three flightcrew members based on maximum flight duty period constraints." RIA, pp.98-99. The FAA then calculated number of adjusted flight hours per flight crew member by dividing the total flight crew members by the adjusted flight hours, and that figure was annualized, yielding the annual adjusted flight hours saved per flight crew member. That estimate was then extrapolated to a subset of the entire U.S. air transport industry which included all charter passenger and large cargo carriers. That total was multiplied by the number of flight crew members for each carrier, resulting in the total number of flight hours saved per carrier. That total was multiplied by the average hourly salary for each carrier, and the results were aggregated to determine a cost savings of $100,000 for charter passenger carriers. RIA, pp.98-101.
    - The FAA used the actual number of flight crew members listed on each carrier's Operating Certificate to calculate the per-carrier cost savings, although these figures are not included in the RIA. Instead, the FAA included only the aggregated cost savings per carrier industry group.

The FAA again relied on the salary data in the 2006 AIR, Inc. report, adjusted to 2009 levels using the ATA Index.

- Overall Reference to Nonscheduled Operators: None specified.

II. Schedule Reliability

1. Overall Assumption: The total industry cost to comply with the proposed rule's reporting requirement would be $1.6 million (nominal cost) / $1 million (present value cost). RIA, p.105.
    - **a.** Assumption: Carriers will use existing software packages which can be modified to create the required reports (and those who do it manually will have no software costs). RIA, p.104.
        - Underlying Data: None.
        - Reference to Nonscheduled Operators: None.
    - **b.** Assumption: "The only carriers who would incur any significant cost would be the ones who do not schedule reliably, that is, those having existing unrealistic scheduled vs. actual times." RIA, p.104.
        - Underlying Data: None.
        - Reference to Nonscheduled Operators: None.
    - **c.** Assumption: "The FAA estimates that each carrier would take about two days to modify their scheduling software to create the required report. We assume that the carriers will use the equivalent of a GS-14, step 5 employee to do this work." RIA, p.104.
        - Underlying Data: None.
        - Reference to Nonscheduled Operators: None.
    - **d.** Assumption: "Each operator would take roughly one more day to prepare, troubleshoot, and submit the report every two months (six reports per year) to the FAA. The FAA assumes that each operator will use the equivalent of a GS-11, step 5 employee . . . ." RIA, p.105.
        - Underlying Data: None.
        - Reference to Nonscheduled Operators: None.

- Overall Underlying Data: To modify scheduling software, the fully loaded hourly cost for a GS-14, step 5 employee is $68.66.[3] With roughly 98 operators, the industry cost would be roughly $108,000 (nominal cost) / $88,000 (present value cost) in 2013. To prepare and submit the reports, the burdened hourly cost for a GS-11, step 5 employee is $33.21,[4] so the annual cost per operator is $1,600 and the total industry cost (98 operators) is $1.6 million (nominal cost) / $1 million (present value cost). RIA, pp.104-05.
- Overall Reference to Nonscheduled Operators: None.

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[3] Although the FAA did not specify the source for the hourly salary rates provided in its calculations, we believe those rates reflect standard government pay scales for the ranks indicated, and therefore we have not listed these hourly salary rates as assumptions.

[4] See n.5, supra.

III. Fatigue Training

A. Flight Crew Members

1. Overall Assumption: Fatigue training for flight crew members will total $234.2 million (nominal cost) / $149.3 million (present value cost). RIA, p.107.
   - Overall Underlying Data: "Flightcrew member fatigue training costs are equal to the number of flightcrew member training hours multiplied by the average hourly salary." RIA, p.108.

   a. Assumption: Initial fatigue training for flight crew members will be 5 hours long, and recurring training will be 2 hours each year.
      - Underlying Data: None.
      - Reference to Nonscheduled Operators: None.

   b. Assumption: The annual retirement rate for flight crew members is 3.3%.
      - Underlying Data: None.
      - Reference to Nonscheduled Operators: None.

   c. **T**he annual "churn" rate for flight crew members is 1%.
      - Underlying Data: None.
      - Reference to Nonscheduled Operators: None.

   d. Assumption: An equivalent number of flight crew members will be qualified to replace those that retire. RIA, p.108.
      - Underlying Data: None.
      - Reference to Nonscheduled Operators: None.

   e. Assumption: Flight training will be incorporated into distance learning programs. RIA, p.108.
      - Underlying Data: None.
      - Reference to Nonscheduled Operators: None.

   f. Assumption: "The total number of flightcrew members for each year from 2013 to 2022 is assumed to be equivalent to the total number of flightcrew members holding certificates in October 2009, as recorded by OPSS." RIA, p.108.
      - Underlying Data: The FAA counted the number of flight crew members as recorded on each carrier's Operating Certificate as of October 2009. Organized by industry group, as of October 2009 there were 12 Part 121 charter passenger carriers with 1,230 Part 121 flight crew members. RIA, pp.107-08.
      - Reference to Nonscheduled Operators: The numbers of charter passenger Part 121 carriers and flight crew members are a snapshot of the number of Operating Certificates and the flight crew members listed therein in October 2009.
   - Additional Underlying Data: The average hourly salaries of flight crew members were determined based on carrier-specific annual salary data from the 2006 AIR, Inc. report, which were divided by "the minimum guaranteed pay credit hours per month as defined in pilot labor agreements," and then updated to 2009 levels using the ATA Index. RIA, p.109.

   g. Assumption: The pilot labor agreements (not specified in the RIA) used by the FAA contained appropriate minimum guaranteed pay credit hours per month for application to supplemental carriers. RIA, p.109.

    - Underlying Data: None.
    - Reference to Nonscheduled Operators: None to the extent that nonscheduled operators' costs are not included in the 2006 AIR, Inc. report or the ATA Index.
- Overall Reference to Nonscheduled Operators: None specified. The FAA identifies the number of Part 121 charter passenger carriers and flight crew members using data in each carrier's Operating Certificate as of October 2009.

B. Dispatchers and Management

1. Overall Assumption: The overall cost increase from providing the fatigue training in the proposed rule to dispatchers and management personnel is 12%, or a total of $28.1 million (nominal cost) / $17.9 million (present value cost). RIA, pp.111-12.

- Underlying Data: The FAA assumed that "[t]he number of dispatchers in the U.S. air transport industry is equal to approximately three percent of the number of pilots" and "[t]he number of management personnel is estimated to be three times the number of dispatchers," which together total 12 percent of total flight crew members. RIA, p.111. The FAA did not provide the sources of these estimates.
- Reference to Nonscheduled Operators: None.

a. Assumption: "The number of dispatchers in the U.S. air transport industry is equal to approximately three percent of the number of pilots." RIA, p.111.

- Underlying Data: None.
- Reference to Nonscheduled Operators: None.

b. Assumption: "The number of management personnel is estimated to be three times the number of dispatchers." RIA, p.111.

- Underlying Data: None.
- Reference to Nonscheduled Operators: None.

IV. Rest Facilities

A. Installation

1. **1.** Assumption: The cost per installation for rest facilities will be: (1) Class 1[5] = $259,000-$1,500,000; (2) Class 2[6] = $46,000; and (3) Class 3[7] = $31,000. RIA, p.115.
    - Underlying Data: "The FAA obtained detailed cost estimates from two supplemental type certificate (STC) holders. Their estimates indicate that Class 1 facilities are much higher in cost relative to Class 2 and 3 facilities, which are roughly equivalent. For the purposes of this analysis, FAA averaged the cost estimates from the two STC holders and summarized the costs into a per-installation cost." RIA, p.115. The FAA did not explain why averaging the data its received from two STC holders is appropriate for (or even relevant to) aircraft used by supplemental carriers.
    - Reference to Nonscheduled Operators: None.
2. **2.** Assumption: "FAA believes that in the long term it is more cost effective for carriers to install rest facilities than to add pilots to the flightcrew. . . . The FAA found that it is always cheaper to use a higher level rest facility than to add a flightcrew member." RIA, p.116.
    - Underlying Data: "The FAA has analyzed the duty matrix and evaluated it in terms of the additional costs per pilot versus the costs of additional facilities and estimates that in the long run it would always be less costly to provide rest facilities rather than to add a pilot." RIA, p.117.
    - Reference to Nonscheduled Operators: None.
3. **3.** Assumption: "Our analysis assumes that there are always three pilots available per flight and that carriers attempt to minimize the potential flightcrew costs." RIA, p.117.
    - Underlying Data: None.
    - Reference to Nonscheduled Operators: None.
4. **4.** Assumption: "FAA believes that no Class 2 or Class 3 rest facility will need to be added or upgraded on any of the aircraft currently used in international transportation because existing business or first class seats meet the requirements as Class 2 or Class 3 rest facilities." RIA, p.116.
    - Underlying Data: None.
    - Reference to Nonscheduled Operators: None.

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[5] The FAA defines a Class 1 rest facility as "a bunk or other surface that allows for a flat sleeping position and is located separate from both the flight deck and passenger cabin in an area that is temperature-controlled, allows the crewmember to control light, and provides isolation from noise and disturbance." RIA, p.114.

[6] The FAA defines a Class 2 rest facility as "a seat in an aircraft cabin that allows for a flat or near flat sleeping position; is separated from passengers by a minimum of a curtain to provide darkness and some sound mitigation; and is reasonably free from disturbance by passengers and crewmembers." RIA, p.114.

[7] The FAA defines a Class 3 rest facility as "a seat in an aircraft cabin or flight deck that reclines at least 40 degrees and provides leg and foot support." RIA, p.115.

5. **5.** <u>Assumption</u>: The total estimated cost of on-board rest facilities is $49.8 million (nominal cost) / $40.7 million (present value cost). RIA, p.116.
    - <u>Underlying Data</u>: "In order to estimate the total cost of on board rest facilities, the FAA multiplied the unit costs by the number of aircraft that could be affected by the rule (defined as aircraft that operate long range)." RIA, p.116. "Rest facilities will need to be installed or upgraded on 104 aircraft used in international service. . . . Nineteen of these aircraft will have bunks installed at $1.5 million per aircraft and the remaining 85 aircraft will have the single bunk facility upgraded to a double bunk facilities at $250,000 per aircraft." RIA, p.116. The FAA did not provide any foundation for its calculations.
    - <u>Reference to Nonscheduled Operators</u>: None.

B. Loss of Passenger Revenue

1. <u>Overall Assumption</u>: "The proposed rule will result in the loss of passenger revenue because carriers will need to assign flightcrew members to rest in Class 2 or 3 rest facilities (i.e. business/first class seats) rather than cheaper coach seats. The loss of passenger revenue is thus equal to the fare difference between business/first class seats and coach seats." RIA, p.117.

- <u>Overall Underlying Data</u>: "FAA analyzed one year of actual flights to determine the categories and total number of aircraft and flights affected. We multiply the estimated number of affected flights by the revenue lost when Class 2 or Class 3 rest facilities are used. The weighted average additional incremental loss for a Class 2 rest facility is $2,034 and the weighted average cost for a Class 3 rest facility is $5,084. We multiply the estimates number of annual flights by the appropriate estimated cost of the revenue lost. The total cost would be $17.7 million." RIA, p.117 (footnotes omitted). The FAA did not provide the source for any of the cost figures it provided.
- <u>Overall Reference to Nonscheduled Operators</u>: None.

a. <u>Assumption</u>: "Currently, most carriers assign flightcrew members to rest in coach seats during augmented operations." RIA, pp.116-17.

- <u>Underlying Data</u>: None.
- <u>Reference to Nonscheduled Operators</u>: None.

V. Fatigue Risk Management System

The FAA did not consider the cost of a fatigue risk management system ("FRMS") because it is not required in the proposed rule, although carriers may develop such systems as an alternative to the proposed rule. The FAA asks for comments on this cost as it is not included in the cumulative cost presented.[8]

1. **Assumption**: "In addition to the costs considered for the proposed amendments, there may be costs of a fatigue risk management system ("FRMS"). . . . The FAA estimates that an FRMS program would cost between $0.8 and $10.0 million for each operator over ten years. The FAA believes that about 35 operators have at least partially adopted a FRMS program at this time. The FAA estimates the total cost would be $205.7 million ($144.9 million present value), which would be more than offset by a reduction in crew scheduling costs. Accordingly, the cost is not added to the total costs imposed by this rule. The FAA calls for comment on this aspect of the proposal as it has not assigned a cost to the cumulative maximums." RIA, p.74 (footnote omitted).
    - Underlying Data: None. The FAA did not explain how it came up with its estimates.
    - Reference to Nonscheduled Operators: None.
2. **Assumption**: In the NPRM, the FAA acknowledged that various types of supplemental operations may not be adequately addressed by the proposed rule's requirements, and it proposed certain case-by-case exceptions to the proposed rule's requirements that may be permitted. See 75 Fed. Reg. at 55875-76 ("The proposed regulation contemplates that the air carrier will develop a[] FRMS if it cannot restructure its operations so that only very few of those operations continue to need the exception.").
    - Underlying Data: None.
    - Reference to Nonscheduled Operators: None specified. Although the FAA discussed various types of supplemental operations that may not be adequately addressed by the proposed rule's requirements, it did not specifically discuss nonscheduled operations.

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[8] The FAA noted in the NPRM that NACA proposed a requirement that all nonscheduled operators develop and implement FRMSs. See 75 Fed. Reg. at 55854. The above analysis addresses only the FAA's proposals.

APPENDIX F

to

Comments of National Air Carrier Association
(November 15, 2010)

Docket FAA-2009-1093

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TAB 16

United States Department of Transportation
Federal Aviation Administration

In the matter of

Flightcrew Member Duty and Rest Requirements
Proposed Rule

Docket No.: FAA-2009-1093

COMMENTS OF SOUTHERN AIR, INC.

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November 15, 2010

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EXECUTIVE SUMMARY

Southern Air, Inc. ("Southern") respectfully submits these comments to a Notice of Proposed Rulemaking ("NPRM") from the Federal Aviation Administration ("FAA" or "the agency"), entitled "Flightcrew Member Duty and Rest Requirements," Docket No. FAA-2009-1093. *See* 75 Fed. Reg. 55,852 (Sept. 14, 2010) (the "proposed rule").

Through the proposed rule, FAA seeks to make sweeping changes to its flight, duty, and rest regulations for all part 121 certificate holders to address concerns about flightcrew member fatigue.[1] Southern shares the agency's interest in preventing the potentially harmful effects of fatigue in aircraft operations. Indeed, Southern has instituted various measures that have helped to ensure the safe operation of its nonscheduled, or on-demand, cargo flights around the globe.

Nonetheless, the NPRM fails to address the unique environment of flightcrew members operating on-demand cargo flights, and the result is a proposed rule that is defective in many respects and that would have devastating effects on the nonscheduled cargo sector of the industry. In particular, FAA ignores that the nonscheduled cargo carrier sector of the industry depends upon *flexibility* in conducting flight operations, and already provides crewmembers long, restorative rest periods between flights. The proposed rule, with its myriad restrictions on flight time, duty period, and other factors, would severely hamper Southern's ability to respond to the ever-changing needs of its clients—including the U.S. military and worldwide humanitarian organizations—yet would not provide any established safety or other benefit. FAA should give much more detailed consideration to the following deficiencies in the NPRM before proceeding to adopt a final rule.

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[1] Southern incorporates by reference the comments submitted by the National Air Carrier Association ("NACA"), of which Southern is a member.

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2. The Proposed Rule Is "Arbitrary and Capricious" And Therefore Subject To Serious Judicial Challenge. If the agency proceeds, Southern will seek judicial relief to set aside the NPRM under the Administrative Procedure Act ("APA"), 5 U.S.C. § 706(2)(A), as an "arbitrary and capricious" exercise of the agency's authority. These reasons include the following:

- The proposed rule does not adequately account for the unique business model of Southern and other on-demand carriers, who depend upon flexibility in their operation of nonscheduled flights. The value to its clients is Southern's ability to transport cargo virtually anywhere around the world at any time; last year, Southern flew to 190 destinations. The NPRM ignores the demands of nonscheduled operations, including the large number of routes; the need for extensive nighttime flying; and the persistence of flight delays, driven by clients, airport authorities, and groundhandlers, that are beyond Southern's control. To comply with the proposed rule, Southern would not only have to increase its flightcrew staff substantially; it would also have to reduce the number of destinations to which it flies, and would be unable to accommodate changing client demands. That would be devastating to Southern's business.

- The NPRM is based upon incomplete and, in some cases, faulty data about fatigue and flight safety. In particular, FAA has failed to consider the typical schedules of Southern's flightcrew members, who fly long segments but also have extended periods of rest between operations. This fundamentally distinguishes them from the schedules for scheduled passenger carriers' flightcrew members, whom the NPRM seems primarily designed to protect.

- FAA has not satisfied its obligation to consider the effects of the proposed rule on small businesses like Southern, which will disproportionately feel the impact of the NPRM.

- The proposed rule would hamper U.S. military efforts, as well as humanitarian and disaster relief efforts. Military and aid organizations rely heavily upon Southern to transport cargo around the world, including to remote and inhospitable locations. The NPRM will make such operations lengthier and more costly, impeding fast and efficient air cargo service to places where it is needed most. Although the proposed rule contains some exceptions for defense emergencies, these are insufficient to account for most of Southern's operations supporting the military.

- The NPRM would harm the U.S. economy. Southern and other carriers are likely to find it much more difficult, if not impossible, to retain U.S. flightcrew members for operating nonscheduled flights, and a significant portion of this part of the industry may hire flightcrew members from outside of the U.S. Furthermore, the NPRM runs afoul of U.S. economic policy, which seeks to ensure that U.S. businesses have an opportunity to be equally competitive with their foreign counterparts.

- FAA has not offered any legitimate justification for imposing identical rules on scheduled and nonscheduled operations, which comprise entirely different sectors of the aviation industry. Furthermore, FAA has not offered any legitimate justification for imposing different rules on nonscheduled cargo and nonscheduled passenger operations, which are similarly situated businesses. The agency has not applied the proposed rule to part 135 operators, based upon concerns about the economic effects upon the members of that industry. But those effects are just as harsh for Southern and other small business on-demand carriers, who are subject to the NPRM.

- The NPRM places an unfair burden upon certificate holders to observe and monitor the symptoms of fatigue. Indeed, the proposed rule seeks to regulate rest by requiring carriers to provide wide and complex bands of rest opportunity, with no corresponding obligation upon flightcrew members to maximize their rest. Flightcrew members are in a superior position to know whether they are fatigued, and to ensure that they have obtained proper rest when off duty. Nonetheless, the NPRM requires certificate holders to spend significant resources to monitor flightcrew members for indications of fatigue, including various training and reporting requirements, which would be costly and logistically problematic for Southern.

- The "risk management system" that FAA has proposed is insufficient to address Southern's concerns. Southern would almost certainly need approval for a risk management system applicable to all of its present operations. Such a system would be difficult and costly to create, and there is no reasonable assurance that the agency would adopt it in any event.

3. The Proposed Rule May Violate The Takings Clause. Furthermore, the proposed rule may amount to a taking that would require the government to provide "just compensation" under the Fifth Amendment. The law is clear that a regulation may be so onerous as to amount to an appropriation or deprivation of private property that runs afoul of the takings clause.

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Furthermore, because the NPRM imposes more restrictions than are necessary to safe operations, and takes no account of the needs of on-demand carriers, the NPRM may be at odds with the longstanding executive branch policies against overbroad regulations that impair private property interests.

* * *

In light of these concerns, Southern respectfully requests that FAA exempt Southern and other nonscheduled cargo carriers from the NPRM. To the extent that FAA continues to have concerns about mitigating the effects of fatigue in nonscheduled flight operations, it should carve out that sector of the industry for separate regulatory treatment, perhaps through a different rulemaking process. FAA should seek to ensure that its regulations accomplish their intended purpose without unduly interfering with carriers' legitimate business expectations, and should not displace the procedures that Southern and other carriers already have in place to ensure safe operations. At a minimum, even if the agency does not carve out the nonscheduled sector for a separate regulatory treatment, as explained in greater detail in these comments, FAA should remove from the NPRM these certain provisions that impose the greatest harm on nonscheduled cargo carriers and pose the greatest threats to Southern's viability, including the following:

- *Acclimating.* The NPRM provisions about acclimating are unduly burdensome upon Southern, whose flightcrew members would frequently need to re-acclimate to new theaters around the globe before continuing with flight operations. The extended rest periods that Southern's pilots receive should be adequate to address the agency's concern. In all events, lengthy acclimation periods are useless without corresponding, increased obligations on flightcrew members to moderate their behavior to address fatigue.

- *Flight Time Limits.* The NPRM's flight time limitations are unnecessary in light of the provisions relating to duty time and hamper Southern's operations, because Southern depends upon flexibility in conducting nighttime flights.

- *Reserve Time.* Southern depends upon being able to keep flightcrew members on reserve because it frequently experiences delays beyond its control, both from changing client demands and from receiving lower priority for obtaining groundbased services such as handling, fuel, de-icing, and so on. Thus, Southern contends that the NPRM would hamper this practice and impair Southern's ability to respond to its clients' needs.

- *Short Repositioning Legs by Augmented Crews.* The proposed rule would require that the pilot controlling the aircraft on landing of the last leg of an augmented flight be provided with two hours of rest *inflight* during the last leg. But Southern requires the flexibility to conduct a short ferry flight as the last leg of a mission to reposition the aircraft, and Southern's pilots are already able to obtain the same two hours, or even more, rest earlier in the mission, or while cargo is being unloaded on the ground, before the last leg.

BACKGROUND

Southern's Commercial Operations. Southern is a supplemental cargo carrier operating under part 121 of the Federal Aviation Regulations ("FARs"). Its predecessor company, Southern Air Transport, was founded in 1947 and Southern has merged with Cargo 360 to form Southern Air Holdings, Inc. Southern's corporate headquarters are in Norwalk, Connecticut.

Southern provides a variety of nonscheduled cargo services to clients around the world, including the following:

- *ACMI.* Southern is primarily a provider of Aircraft, Crew, Maintenance, and Insurance ("ACMI") arrangements, sometimes referred to as "wet leases." Through ACMI agreements, Southern's clients obtain flexibility in obtaining nonscheduled air cargo capacity and are able to expand their presence in various locations—all while saving the substantial costs involved in owning and operating an aircraft, and obtaining the benefits of Southern's expertise in conducting international flight operations.

- *CMI.* Southern offers Crew, Maintenance and Insurance ("CMI") services to some clients who wish to handle shipments without having to hire and train their own crews.

- *Charter.* Various private and governmental organizations charter Southern flights to carry a variety of cargo, including for military and humanitarian operations.

- *Operational Planning and Supplementary Services.* Southern assists its clients with various aspects of cargo carrying, including permits, ground handling, landing rights, flight planning, and route performance analysis.

In 2009, approximately 77% of Southern's hours flown were from ACMI contract operations, approximately 11% of Southern's hours flown were from government charter, and approximately 12% of Southern's hours flown were from other charter business. *See* Declaration of Roy Linker ("Linkner Decl."), ¶ 5, attached as Exhibit 3. Southern does not itself sell the cargo it carries on its aircraft. *See id.*

Most of Southern's clients are foreign commercial air freight carriers operating abroad that contract with Southern to carry cargo, and who depend upon air cargo as a substantial source of their revenue. (Linkner Decl. ¶ 3.) From 2007 through September 2010, Southern flew for 60 different customers. *See id.* Southern's current clients include, among others: CAL Cargo Air Lines Ltd.; Korean Air Cargo; Shanxi Sunshine Express; Ethiopian Airlines; Malaysian Airlines Cargo ("MASkargo"); Thai Airways Cargo; and Lufthansa Cargo Charter Agency. *See id.*

Southern's client base and operations have a particular emphasis in Asia and the Pacific Rim, but Southern has a substantial presence in various other areas throughout the world. *See id.*

Southern offers a variety of ACMI programs and terms to fit the needs of its clients. (Linkner Decl. ¶ 4.) Each arrangement is unique. *See id.* A long-term wet lease may require several weeks to implement and may last for two to four years. *See id.* On the other hand, Southern will sometimes arrange a single charter flight for a client in a matter of hours. *See id.*

Southern transports a wide variety of cargo for its clients, including small and large packages; palleted cargo, perishable items (*e.g.*, food, cut flowers, and vaccines); livestock (including thoroughbred horses); heavy equipment and material for use in the entertainment industry (e.g., Formula One automobiles and concert tour equipment); military and aid supplies; and hazardous material. (Linkner Decl. ¶ 6.)

In sum, as a part of the nonscheduled cargo sector, Southern helps to provide a critical link in the global commerce and humanitarian supply chain. Not all cargo can move all of the time on a scheduled basis, and Southern helps to fill that critical niche.

Southern's Military and Humanitarian Operations. Southern provides extensive services to the United States military by carrying cargo between military installations abroad. The civilian commercial sector moves approximately 40% of all U.S. military cargo around the world. *See* Congressman James L. Oberstar, Opening Statement to the Subcommittee on Aviation, The Economic Viability of the Civil Reserve Air Fleet Program (May 13, 2009), *available at* http://transportation.house.gov/News/PRArticle.aspx?NewsID=911. Of the cargo carried by the commercial sector for the military, 95% or more is carried by all cargo carriers, including nonscheduled cargo airlines. A significant portion of Southern's business includes these military support missions. Over the past few years, Southern has delivered high priority military cargo in support of operations in North American, Europe, Asia, the Middle East, Afghanistan, and Africa. *See* Declaration of Richard Macri ("Macri Decl.") ¶ 8 (attached as Exhibit 4).

In support of current military efforts, Southern flies aircraft in support of the war effort into multiple locations within Afghanistan, including Kabul, Kandahar, Bagram, and Mazar I Sharif. Southern also flies into Kuwait in support of the war effort in Iraq. REDACTED These missions included shipments of engines, trailers, restocking supplies, perishable and nonperishable food, the most advanced armor-plated vehicles (M-ATVs), and blood. Southern has also had the honor of delivering the remains of soldiers who lost their lives in Afghanistan and Iraq back to their families in the United States. (Macri Decl. ¶ 9.)

These mission critical airlift deliveries require flexible, on-demand air transport, which Southern provides in a safe and cost effective manner. Military shipments, such as the delivery of lifesaving blood, are often desperately needed in the deployed combat location, but they regularly encounter delays in packaging and delivery to the aircraft. It is not unusual for a military charter to change cargo or delivery destinations at the last minute due to changing demands. The ability to adapt to these changes as they occur and still make timely delivery of cargo adds tremendous value for Southern's military customers. (Macri Decl. ¶ 10.)

Many of Southern's military missions are one-way deliveries. These missions require the aircraft to deliver cargo to a deployed operating base, but, due to a lack of outbound cargo from the combat zone, aircraft often depart the deployed location without cargo. (Macri. Decl. ¶ 9.) Of course, Southern must account for the costs of operating these empty aircraft when contracting for military transport missions. Under the current rule, Southern's aircrew are able to safely complete most military missions within one crew duty day, thereby minimizing the costs to the military associated with flying the empty aircraft. *See* Part IV, *infra* (discussing an example of why these missions will no longer be possible under the NPRM).

Southern has also assisted in humanitarian relief efforts worldwide by carrying aid supplies to areas affected by famine, drought, earthquakes and other catastrophes. Among other organizations, Southern has helped to provide relief material on behalf of various governmental and nongovernmental organizations ("NGOs"), including the United Nations Children's Fund ("UNICEF") and the United States Agency for International Development ("USAID"). This past year, after the earthquake in Haiti, Southern delivered frontline assistance from the Thai government and other organizations. Southern's capable fleet is invaluable to providing such assistance, because its freighters can be "nose loaded" to carry virtually any cargo necessary for relief operations. Southern is uniquely positioned to schedule flight operations flexibly, thereby enabling it to respond quickly to crises. (Macri. Decl. ¶ 12.)

Aircraft. Southern's fleet consists of two types of aircraft. First, Southern owns fourteen Boeing 747-200F freighters, with three of the aircraft leased under capital leases. *See* Declaration of James Walsh ("Walsh Decl."), ¶ 3, attached as Exhibit 5. Nearly half of Southern's 747-200Fs are production-built for nose and side door loading, which is unique among operators of that aircraft. Ten of the aircraft were acquired prior to Southern's merger with Cargo 360 in September 2007. Four of the aircraft were acquired after September 2007.

Second, Southern has two Boeing 777 freighters, which it leases pursuant to twelve-year leases that expire in 2022. Southern is the world's only ACMI provider of the 777F aircraft.

Southern has undertaken various efforts to expand its fleet to better serve clients. During 2011, Southern expects to obtain its first B747-400F aircraft. (Walsh Decl. ¶ 4.) Furthermore, Southern has entered into discussions to lease two B777Fs with delivery expected in 2012. *See id.*

Southern's Operations of Nonscheduled Flights. Last year, Southern flew to 190 unique destinations around the world. (Linkner Decl. ¶ 7.) In the same period, it flew over 770 different routes, and 379 of those routes were flown only 1 time. *See id.* From 2007 through September 2010, Southern flew to 300 unique locations and 1,650 different routes. *See id.* Southern estimates that in 2010 it will carry over 2.7 billion Freight Tonne Kilometers ("FTKs") of cargo. *See id.*

In general, Southern conducts nonscheduled air cargo operations. Although many of Southern's operations follow "base schedules" made with advance notice, even those flights are subject to extensive changes on short notice – sometimes only a few hours. *See* Declaration of Paul E. Chase ("Chase Decl."), ¶ 3, attached as Exhibit 6. Furthermore, a large portion of Southern's business involves highly variable seasonal work, including transporting foods and other perishable items, as well as unpredictable charter and humanitarian operations. And Southern sometimes assists other larger cargo carriers during busy seasons, particularly in December, when these carriers may not have the capacity to meet market demand on their own. To provide its hallmark level of service to its clients, therefore, Southern depends not only upon its experience and resources, but also, upon a regulatory regime that permits nonscheduled carriers to maintain their valuable agility without compromising safety. Southern has achieved precisely that balance in its operations.

Southern's business is organized very differently from those of the major passenger and cargo airlines. Southern's corporate headquarters is located in Norwalk, Connecticut. Southern does not have any primary basing location for its aircraft or crews. Southern currently has a fleet of sixteen aircraft. Maintenance for Southern's fleet of 16 aircraft is performed at fourteen different forward maintenance bases located on four different continents. This globally dispersed infrastructure is what allows Southern to provide service worldwide with little prior notice.

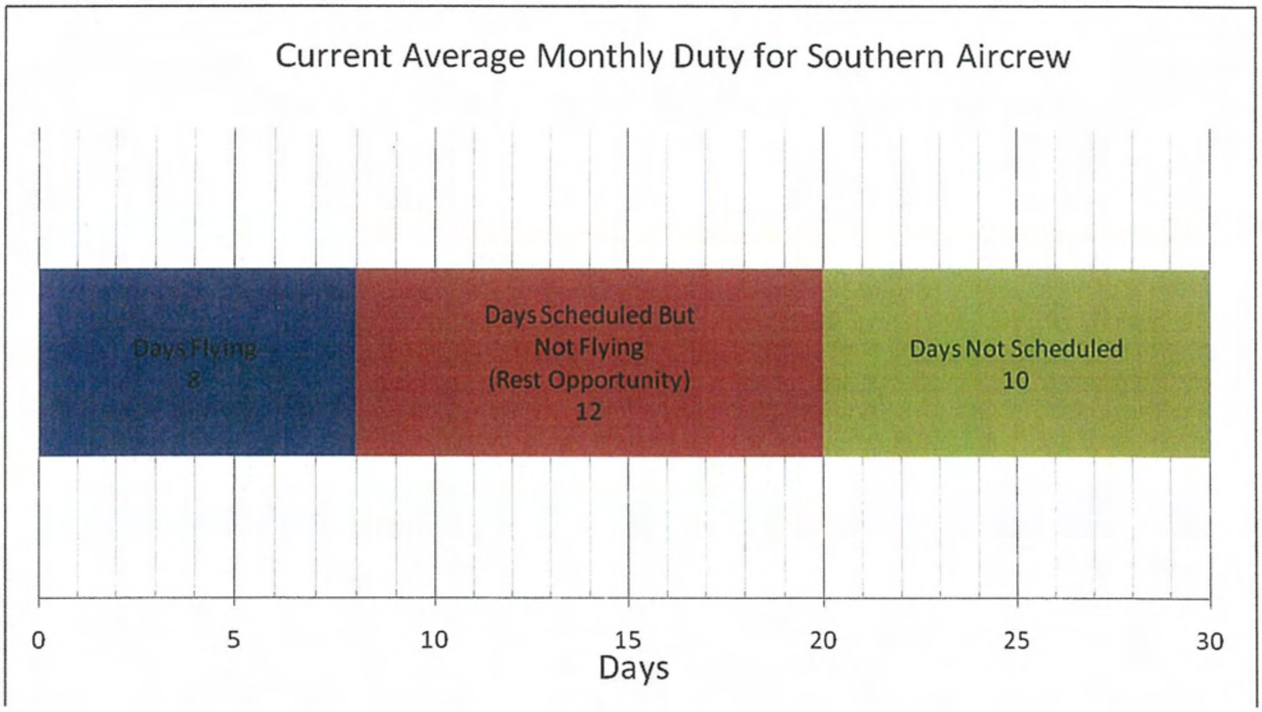
Southern's Flightcrew and "Home Basing." Southern has 725 employees, including 379 flightcrew members: 124 captains, 152 first officers, and 103 flight engineers. Southern is in the process of increasing its crew force to 404 as a few pilots return from extended leave and several newly hired first officers and flight engineers complete training. *See* Kovach Decl. ¶ 5.

Southern is one of the few air carriers that allows crewmembers to be "home based." Under this system, flightcrew members have a "residence airport" within 100 miles of their residence. *See* Agreement Between Southern Air Inc. and Southern Air Crew Group ("CBA"), § 8(C), attached as Exhibit 7. This is a significant benefit, provided by only a few airlines, and differentiates Southern's compensation package from many of its peers. (Kovach Decl. ¶ 6.) Southern is responsible for deadheading crewmembers from the resident airport to the destination of flight start. With the exception of seven Korean National 747 flight engineers, all of Southern's flightcrew members are United States citizens. Most of Southern's pilots live within the 48 contiguous United States, although there are some in Alaska and Hawaii. (Kovach Decl. ¶ 7.)

Another significant benefit to Southern's flightcrew is that the current CBA guarantees payment for 60 hours per month regardless of flight time. *See* CBA § 4(A). Most of Southern's flightcrew members fly far fewer than 60 hours per month; currently, the average pilot flies 46 hours per month. (Kovach Decl. ¶ 8.)

Southern schedules its flightcrew to work for 20 days out of every month, with incremental mandatory days off for mandatory 24-hour rest in 7 days ("1/7"). It also provides additional discretionary 1/7 as the scheduling permits. Most crew members are scheduled for either the first 20 days or the last 20 days of the month, so that during the middle of the month, all, or nearly all, of Southern's active crew members are scheduled. During the time when a crewmember is scheduled, he or she is on reserve until assigned to a flight. Once crewmembers are paired with a flight, they either fly the mission or enter reserve, depending on the needs of the flight. Southern's crews do not split duty. (Kovach Decl. ¶ 9.)

Under the CBA, crewmembers are guaranteed a minimum of 9 hours free from duty following a duty day of no more than 18 hours, minimum of 12 hours following a duty day of 18-24 hours, and a minimum of 18 hours following a duty day of more than 24 hours. This negotiated agreement exceeds the current FAA requirements. On average, a crew member at Southern averages 46 block hours per month. In 2010, the average block hour per flight cycle at Southern is 5.42 hours for 747 operators and 7.72 for 777 operators, meaning that the average crew member only operates 6-8 flights in a normal 20-day work month, resulting in a 10-12 day rest opportunity in addition to the 10 days off per month. Southern's aircrews operate well below the maximum flight duty time allowed by existing FAA regulations.



Southern's Flight Routes. Southern's flight routes are diverse and ever-changing. Approximately 70 percent of Southern's business is conducted through long-term arrangements, while the remaining 30 percent is booked within short windows of advance notice—typically within a week or less. As noted above, in the past year Southern flew its sixteen aircraft into 190 different destinations. These destinations ranged from regularly scheduled flights, such as its regular route between Inchon and Anchorage, to short notice flights, such as the airlift that Southern provided for the relief efforts following the devastating Haiti earthquake.

Southern's diverse flying routes traverse crews through numerous different countries. The majority of Southern's routes cross more than four time zones. Flightcrew members must obtain visas in the various countries to which Southern flies. In most of these countries, Southern's crewmembers can obtain single entry visas upon arrival, but in some instances, crewmembers require pre-obtained visas. Visas typically cost between $500 and $3500.

India is a country where visas are expensive and time consuming for Southern to obtain. Under the NPRM, this time and expense will be multiplied. For example, Southern currently flies a route from Bangkok to Amsterdam, with a stop in Delhi, India. Under the current rules, Southern is able to fly this route with an augmented crew. Under the NPRM, this will no longer be possible. Instead, Southern will be required to fly aircrews on commercial flights into India to fly the Delhi-to-Amsterdam leg. This crew swap will greatly increase the uncertainty and expense for Southern. First, there is the added coordination and expense of the additional crew. However, almost as difficult is the issues the deadhead crew will have obtaining visas. While the aircrew flying the aircraft into India can obtain visas upon arrival, the deadhead crew must obtain visas prior to boarding their commercial flight into India. This will require advance notice, which Southern generally does not have and which runs counter to Southern's flexible business model. Due to historic and ongoing issues obtaining these visas prior to the deadhead trip, this process will add considerable delay, expense, and uncertainty to missions transiting India.

Flight Delays. Southern's business is built around its schedule flexibility. Southern typically agrees with its customers as to routes and schedules on a month-to-month basis, but in some instances it is determined only days before. (Chase Decl. ¶ 3.) Even after the route and schedule is agreed, the customer often makes changes on hours' or days' notice. *See id.* For example, Ethiopian airlines changes its commercial schedule with Southern on average 20-30 times a month. *See id.* Similarly, MASkargo adjusts its commercial schedule with Southern on average 10-20 times a month. *See id.* This prevents Southern from setting flight schedules, crew schedules and rest opportunities in advance of operations as a scheduled 121 carrier can do. Furthermore, Southern often experiences significant commercial and airport delays prior to flight start. (Chase Decl. ¶ 8.)

As an illustrative sample, Southern analyzed all of its flight data for the month of August 2010 relating to delays, and compiled this information in a table.[3] (Chase Decl. ¶ 5 & supporting exhibits.) It determined that in the test month, 39.2% of Southern's total flights were delayed for reasons other than weather and mechanical delays, and the average delay time was 6 hours and 48 minutes. (Chase Decl. ¶ 4.) Most of these delays were in fact customer-driven, including delays in delivery of cargo or cargo loading. (Chase Decl. ¶ 8.) Southern anticipates that customer or airport driven delays will often lead to its pilots exceeding the flight and duty time limits set by the NPRM so that a currently unaugmented flight will need to be operated as an augmented flight or, in some instances, a new crew will need to be swapped in. (Kovach Decl. ¶ 17.) Many times, this will be impractical.

By way of example, on August 15, 2010, Southern was operating flight 3717 from Liege to Lagos to Accra for Ethiopian Air using an unaugmented crew. The commercial departure was scheduled for 18:00Z. As the cargo handler did not prepare the cargo for loading, however, the flight was delayed by about 4 hours and 14 minutes. The crew was called out for a 21:30Z or 11:30 pm local time departure, which means that they arrived at the aircraft at 20:00Z. The

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[3] In performing this analysis, Southern excluded delays that were less than 30 minutes in duration.

flight actually took off at 22:14Z and arrived in Lagos at 4:55Z for a flight time of 6 hours and 41 minutes. It then departed Lagos at 07:13Z and arrived in Accra at 08:38Z for a flight time of 1 hour and 25 minutes. Thus, the flights' actual FDP was 13 hours and 38 minutes and the flight time was 8 hours and 6 minutes. Under the NPRM, a flight using an unaugmented crew with an 11:30 pm local time departure has a maximum FDP of 9.5 hours and a maximum flight time of 8 hours. Under the current rule, however, the flight could be accomplished using an unaugmented crew without exceeding the current rule's flight and duty time limits. In contrast, under the NPRM, the FDP would have been exceeded by 4 hours and flight time is exceeded by 6 minutes. This example shows that if the NPRM were in effect, such delays would significantly hamper Southern's ability to conduct similar flights using an unaugmented crew.

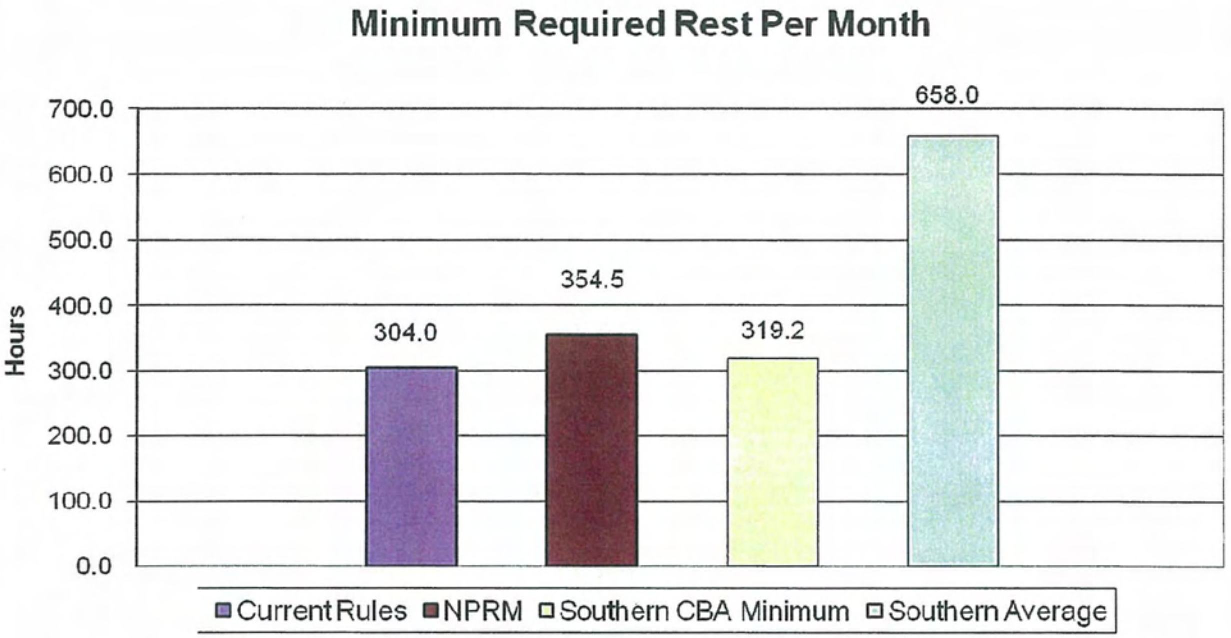
Southern also commonly suffers airport delays in fueling and groundbased services. These delays affect Southern and other nonscheduled carriers more often than passenger and home carriers. *See e.g.,* Operating Limitations for Unscheduled Operations at John F. Kennedy International Airport and Newark Liberty International Airport, Docket FAA-2008-0629, at 75 Fed. Reg. 41156 (July 17, 2008) (FAA limited slots for unscheduled operations in significantly greater proportion to limitation on scheduled operations at JFK and EWR since unscheduled operations have flexibility because of the nature of their operation). In Southern's experience, airports provide priority treatment to passenger and home carriers prior to servicing nonscheduled cargo carriers. (Chase Decl. ¶ 9.) For example, on August 1, 2010 flight 17 from Liege to Togo, Southern received notification from its crewmembers that its aircraft was delayed due to, among other things, the airport loading crew having stopped loading Southern's aircraft to load a flight that was higher priority. *See id.* Under the current rule, if an unexpected delay results in a planned duty day being exceeded, any of the operating crew can advise crew scheduling that additional rest is required. *See* CBA § 6(A)(1). Southern also makes every effort to notify crewmembers of delayed flights prior to report time at the aircraft whenever the scheduled departure time is delayed by more than two hours. *See* CBA § 6(E). Under the current rule, the delay would cause the crewmember to be put on *reserve status* but would not count toward FDP.

In the past, FAA has acknowledged the flexible nature of the nonscheduled carriers' business; unlike scheduled carriers, which must make DOT filings related to delays in scheduled flight times, nonscheduled carriers have no such requirement. The proposed rule would require all part 121 carriers to provide the FAA with schedule reports every two months.

Southern's Excellent Safety Record and Initiatives in Fatigue Management. Southern has developed a reputation for safety in the delivery of services to its clients. Since the inception of the company, Southern has flown without an accident. *See* Declaration of Thomas A. Gillies ("Gillies Decl."), ¶ 3, attached as Exhibit 8. Furthermore, Southern has operated free of any accidents, or indeed any material problems, relating to flightcrew member fatigue. (*Id.* ¶ 4.)

As an operator of numerous long-range flights to destinations around the globe, Southern is naturally concerned about the potentially harmful effects of flightcrew member fatigue. Southern recognizes that a well-rested crew is critical to safe and effective flight operations. Thus, Southern has taken several steps to reduce fatigue and to ensure that its operations are conducted without fatigue-related problems:

- *Scheduling.* As explained above, Southern's system ensures adequate staffing to cover its nonscheduled operations and for sufficient rest. Flightcrew members are on duty for long durations, but also receive extensive rest periods. Indeed, Southern's flightcrew members actually receive significantly more rest than current FAA regulations, or even the CBA, require.



Assumes minimum turn time between flight duty periods and maximum flight duty periods in 30 day period without being restricted by monthly or annual flying hours limits. Also assumes minimum number (4) "1 in 7" 24 hour rest periods and all un-augmented crews.

- *Rest Facilities.* Southern expends substantial time and effort to locate appropriate hotels suitable for flightcrew members. Under FAA's current rest and flight duty regulations, carriers may, without running afoul of duty time limitations, transport crew members to better accommodations "off airport," where the crew is likely to obtain better rest. Such flexibility is particularly important for Southern, which flies to various locations around the world where there are no adequate on-or-near-airport accommodations; in some instances, crewmembers need to be transported for more than an hour to arrive at the best available rest facilities. The proposed rule, which does not start the rest period until the crew reaches the hotel, would impede Southern's efforts to ensure the best possible sleeping facilities for crewmembers. (Gillies Decl. ¶ 5.)

- *Fatigue Risk Management Policy.* Southern has submitted to FAA a Fatigue Risk Management Policy ("FRMP"), attached as Exhibit 9, that Southern will continue to adapt in cooperation with the agency. Under the FRMP, Southern has committed, among other things, to (1) train flightcrew members and schedulers; (2) analyze data relating to flight operations on an ongoing basis to help identify concerns related to fatigue; (3) ensure that flightcrew members are relieved from duty if they report that they are, or are determined to be, fatigued; (4) require crewmembers to submit detailed reports relaying concerns about fatigue issue or incidents; and (5) engage the cooperation of management, employees, and other members of the industry to help alleviate the effects of fatigue. *Id.*

- *Workplace Culture.* Southern recognizes that it is in its own interests—as well as the interests of its clients, other carriers, and the flying public—to promote a culture in which flightcrew members are encouraged to express their concerns about fatigue, and in which flightcrew members are excused from duty in instances in which they are too fatigued to perform their duties. If a flightcrew member informs Southern that he or she is too fatigued to fly, Southern will make arrangements for a substitute crewmember. The flightcrew member will not be penalized for raising a concern about fatigue. On the contrary, the FRMP reflects Southern's approach in this regard: it "will manage crewmember reports in an open and accepting manner," and "[a] crewmember's self assessment and self removal from duty will be honored immediately, without coercion." (Ex. 9.) It has been rare for Southern to receive fatigue-related complaints from its employees, and Southern has never compelled a flightcrew member to fly when the crewmember has raised a concern about fatigue. (Kovach Decl. ¶ 13.)

ANALYSIS

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R E D A C T E D

II. The Proposed Rule Is Arbitrary And Capricious And Will Be Subject To Serious Judicial Challenge Under The Administrative Procedure Act

REDACTED In addition to the irreparable harm that the NPRM would cause to Southern, the NPRM is arbitrary and capricious under the law governing agency action. As such, the proposed rule would be subject to serious challenge on judicial review. FAA should therefore withdraw the NPRM or take steps to address the various deficiencies set forth in these comments and in other commenters' submissions to the agency.

Under the Administrative Procedure Act ("APA"), a "reviewing court shall hold unlawful and set aside agency action, findings, and conclusions found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). "To make this finding the court must consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment[.]" *Almay, Inc. v. Califano*, 569 F.2d 674, 680 (D.C. Cir. 1977) (quoting *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971)). "Normally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Motor Vehicle Mfr. Ass'n of the United States, Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

The agency's "finding must be 'sustainable on the administrative record made.'" *Almay*, 569 U.S. at 681 (quoting *Camp v. Pitts*, 411 U.S. 138, 143 (1973)). "[T]he agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *State Farm*, 463 U.S. at 43 (internal quotation marks and citation omitted). The agency may not "offer[] an explanation for its decision that runs counter to the evidence before" it. *Id.*

A regulation will be held arbitrary and capricious where the agency relies upon "flawed" data while failing to give sufficient consideration to the "objections of those who must comply"—particularly where the agency decision is made "in the face of indications that compliance would be unworkable, [and] in effective disregard of alternate paths to consumer protection proposed by those who must comply." *Almay*, 569 F.2d at 682; *see also Lloyd Noland Hosp. & Clinic v. Heckler*, 762 F.2d 1561, 1568 (11th Cir. 1985) (holding that it is "an abuse of discretion to base a regulation on faulty data"). The courts have set aside agency actions where the agency has relied upon incomplete or inadequate data, or where the studies underlying the agency's decision are flawed. *See, e.g.*, *Friends of the Boundary Waters Wilderness v. Bosworth*, 437 F.3d 815, 825-26 (8th Cir. 2006) (rejecting the Forest Service's calculation of the base period use of several lakes, due to the Service's reliance upon defective survey results); *St. James Hosp. v. Heckler*, 760 F.2d 1460, 1467-68 (7th Cir. 1985) (rejecting the agency's computation formula used to reimburse provider hospitals for the cost of malpractice insurance, where the agency relied upon a study that was based upon an insufficient sample size and contained other errors).

The courts have also set aside regulations in cases where the agency misrepresented, or failed to account for, relevant data. *See, e.g.*, *Owner-Operator Independent Drivers Ass'n v. Fed. Motor Carrier Safety Admin.*, 494 F.3d 188 (D.C. Cir. 2007) (invalidating regulations limiting the hours of service for long-haul truckers, in part because the agency commissioned a study concluding that the risk of a fatal crash doubled between the 10th and 11th hour of time-on-task for truckers, but the agency's model was only 30% higher than the multiplier for the 10th hour) (marks, ellipses, and citation omitted).

An agency's decision may also be set aside where the agency fails to account for the realities of the industry that it regulates, including differences between categories of regulated entities, or differences in sectors of the industry. For example, in *Color Pigments Manufacturers Association, Inc. v. OSHA*, 16 F.3d 1157 (11th Cir. 1994), the court reversed an agency order setting standards for occupational exposure to cadmium. *Id.* at 1164.[5] OSHA's order would have required that cadmium "pigments" be included in the standard governing workplace exposure to cadmium. *Id.* at 1159. Members of the dry color formulator industry challenged OSHA's order on various grounds, since the members of that sector of the industry were exposed to cadmium pigments in the ordinary course of their business. *Id.* In particular, the dry color formulator industry argued that OSHA had failed to give sufficient attention to the unique concerns of that industry, and erred in concluding that the cadmium pigment standard "was technologically and economically feasible for" dry color formulators. *Id.* at 1161. The court held that in "its grouping of the dry color formulator industry with other users of cadmium pigments and its failure to study any particular dry color formulators whatsoever[,] . . . OHSA proceeded generically rather than making the requisite specific findings for this identifiable industry segment." *Id.* The court therefore reversed OSHA's findings and remanded "for a determination of the technological and economic feasibility of the standard as it applies specifically to the dry color formulator industry." *Id.* at 1159.

As explained in greater detail below, the NPRM fails these standards in numerous respects, because it:

- does not account for the unique business model of Southern and other on-demand carriers;
- is based upon insufficient data, particularly as it relates to the nonscheduled sector of the industry;
- does not address the harm to Southern and other small businesses;
- would negatively affect U.S. military efforts and worldwide humanitarian operations;
- would negatively affect the U.S. economy;

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[5] The court applied a "substantial evidence" test as required under the agency's governing statute, rather than the "arbitrary and capricious" standard, 16 F.3d at 1150; furthermore, OSHA has its own standard of "technological feasibility," id. at 1161-62. Nonetheless, the general principles that the court explained in its opinion provide helpful guidance on the agency's course of action in this rulemaking.

- provides no legitimate basis for the disparate regulatory treatment of operators under parts 121 and 135;
- places a disproportionate burden upon carriers to monitor fatigue; and
- proposes a "risk management system" that is insufficient to address the business model of Southern and other on-demand carriers.

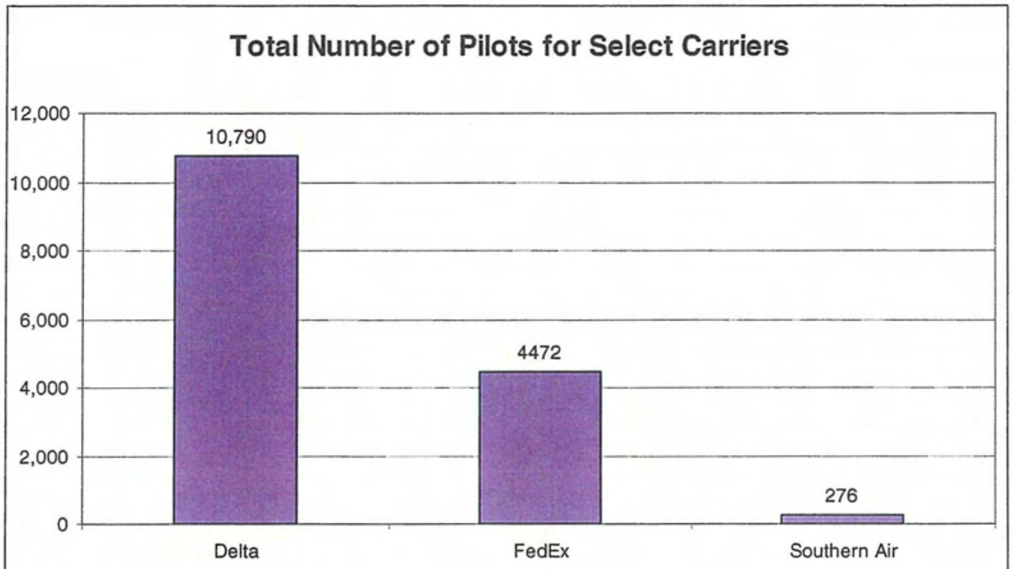
A. The Proposed Rule Does Not Account For The Unique Business Model Of Nonscheduled Carriers Like Southern

As a nonscheduled supplemental cargo carrier, the key to Southern's operations, and to satisfying the needs of its clients around the globe, is *flexibility*. Southern adds value in the marketplace through its expertise in flying cargo to myriad destinations worldwide on short notice, with the ability to adapt to clients' changing needs. Southern accomplishes this through its specially chosen fleet of aircraft and its experienced flightcrew members, who fly long segments and then receive long periods of rest. Through this formula, Southern has expanded its operations while maintaining high standards of quality and safety.

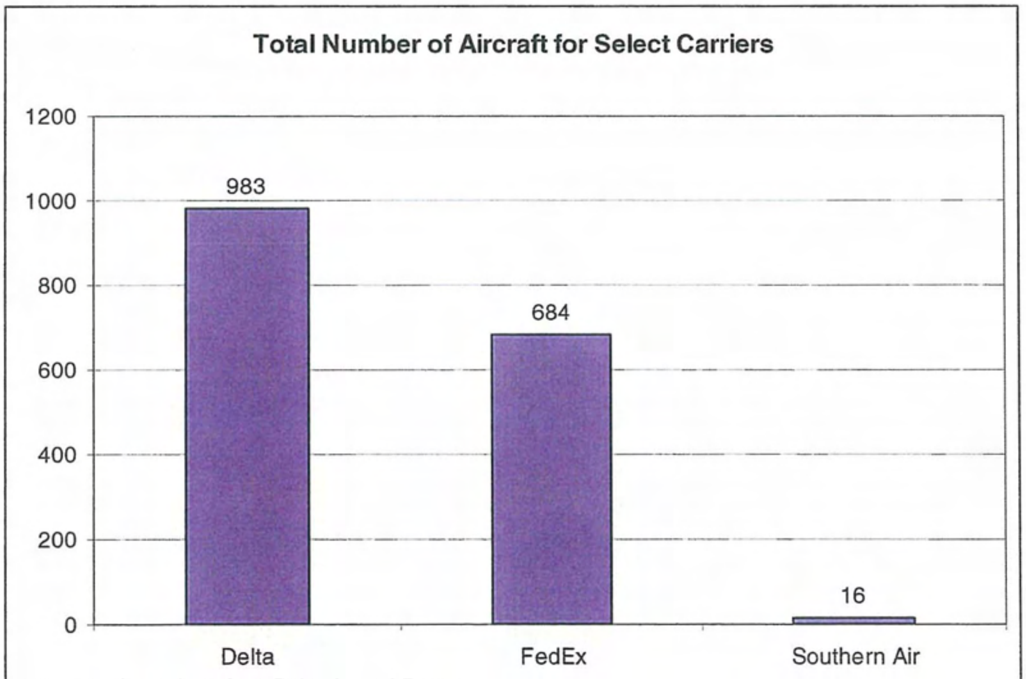
The proposed rule would work a sea change in the regulatory regime applicable to Southern's operations. Given the various additional restrictions on flight and duty time, as well as other costly and burdensome measures, Southern would be severely impeded in its ability to maintain a sufficient flightcrew and offer flights on short notice. Indeed, as explained more fully in Part I, *supra*, the NPRM poses substantial burdens to Southern's entire business model. FAA has therefore "entirely failed to consider an important aspect of the problem," *Overton Park*, 401 U.S. at 416, namely, the effect upon the on-demand sector of the industry, and should reconsider these concerns before promulgating a final rule.

1. The NPRM Contains Onerous Restrictions, Including Flight And Duty Time, That Undermine The Flexibility That On-Demand Carriers Require

The business of supplemental carriers thrives on flexibility and nonscheduled flights. These flights typically involve longer than average flight durations, but these conditions are mitigated by longer than average rest times. As described above, Southern is a small cargo carrier with a limited flightcrew. As a nonscheduled cargo air carrier, Southern's business is a niche market, significantly different from most air operations. The NPRM notes that such small businesses will be significantly impacted by the NPRM, but with a single brush, the NPRM ignores these differences and states that while pilots fly all types of missions, for all relevant purposes, all pilots are the same.



FedEx Pilot numbers from AirlinePilotCentral.com, http://www.airlinepilotcentral.com/airlines/cargo/fedex.htmlhttp://www.airlinepilotcentral.com/airlines/cargo/fedex.html, last visited Nov. 8, 2010.
Delta Pilot numbers from Delta Annual Report, Feb. 24, 2010, *available at* http://www.delta.com/about_delta/investor_relations/annual_report_proxy_statement/.



Delta aircraft numbers from Delta Annual Report.
FedEx aircraft numbers from FedEx Q1 Fiscal 2011 Statistics, available at http://ir.fedex.com/annuals.cfm.

FAA has thus nullified nonscheduled carriers' business model, notwithstanding a proven record of safe flying by such carriers. The NPRM both increases the rest time requirements and reduces what qualifies as rest time. The NPRM transforms airport/standby reserve into a portion of the flight duty period and short term reserve counts toward cumulative duty periods—a totally new proposition, which, as mentioned in the footnotes to the proposed rule, was not even discussed by the ARC and will create "adverse implications" for Southern. 75 Fed. Reg. 55870 n.41. The NPRM also limits the manner by which operators can manage their crew force by limiting the ability to convert crews between short call and long call reserve.

The NPRM adds new limitations on aircrew flight and duty time. The NPRM shortens the 100-hour limit to 28, rather than 30, consecutive days. It also limits the flight and duty time in consecutive 168 and 672 hour periods. The regulations expand the definition of duty to include many aspects of the aircrew's job that have never before been considered as part of the definition and many of which are unrelated to aircraft movement or safety. For example, the NPRM defines duty to include administrative work and training and then limits duty to 65 hours in any 168 consecutive hour period. This means that a pilot who goes to training after completing several days of flying may be restricted from completing training by the duty hour limit even though he will not touch an aircraft during the training. Additionally, because deadhead transportation is also considered duty, the pilot's travel from his completed flight to that training will further exacerbate the burdens placed on carriers related to the definition of duty.

The compounding effect of simultaneously increasing the amount of work that is included as duty and decreasing the amount of time that a crew member is available to perform that duty will greatly increase Southern's operating costs and will likely make its business model unsustainable. Southern has calculated that it will need to increase its crew force by 79 percent in order to continue its operations under the NPRM. The difficulty of increasing the workforce by such a degree with so little time available to implement the requirements is a daunting task. But that may not be the biggest hurdle. In reality, Southern is likely to need to train a much higher percent of its crew force, as pilots from Southern will defect to other air carriers who can pay higher salaries as the proposed rule drives wages up. As the cost and burden of this additional training increases, Southern's labor-related operating costs will skyrocket. As a result, the proposed rule will vastly increase the prices that Southern will be forced to charge in order to remain profitable.

The combined limitations of restricted flight duty times and the expanded definition of flight duty will decrease the flight duty availability of crew members to a level that is unsupported by the science or the historical evidence. Southern estimates that its crewmembers who already only average about 46 hours of flight time per month will, after the proposed rule is implemented, average 25 hours of flight time per month. *See* Background and Part I, *supra*. The remaining time will be spent on reserve duty, training and rest. The NPRM would therefore lead to inefficiency and underutilization of Southern's crewmembers.

The limits on flight duty and duty time in the NPRM are not justified by any history of previous fatigue-related incidents involving Southern or similar nonscheduled carriers. Southern has operated under this model with a proven safety record and an ongoing effort to address concerns about fatigue. Worldwide, the NTSB has investigated only 43 accidents or incidents of any kind involving nonscheduled carriers since January 2005. Of these 43 incidents, only once did NTSB find fatigue as a possible factor.[6] The little science that there is to support the NPRM has understandably focused on the much larger scheduled and passenger carriers and has little or nothing to say about the fatigue levels of nonscheduled cargo crews, who routinely experience longer periods of rest between routes. While the NPRM may be correct that "there are no physiological differences between pilots who fly cargo planes and pilots who fly passenger planes," the demands placed on these pilots under vastly different lifestyles and mission requirements will clearly have a different impact on their fatigue levels.

2. The NPRM Fails To Address The Concerns of Nonscheduled Operators Regarding Nighttime Flying

The proposed rule contains restrictions on nighttime flying that make many of Southern's worldwide operations far more costly and complicated. As the agency recognizes, current regulations permit a wide range of nighttime operations, including consecutive nighttime flying, "as long as the crewmember receives 24 consecutive hours free from duty in a 7-day period." 75 Fed. Reg. 55,867. Indeed, the current regulations treat nighttime flying the same as flying during other parts of the day. But under the proposed rule, a flightcrew member may not "accept more than three consecutive nighttime flight duty periods unless" there is a rest opportunity provided at a "suitable accommodation" under the "split duty" provisions of the NRPM. NPRM §§ 117.27, 117.17. Furthermore, the proposed rule links flight and duty time restrictions to the crewmember's home base, with heavier restrictions in place for duty periods that begin during nighttime hours. *See* 75 Fed. Reg. 55888-89. FAA has proposed these restrictions without any real evidence that nighttime flying poses special risks—particularly for on-demand carriers like Southern.

Such limitations severely impede Southern's ability to conduct long-segment nonscheduled flights to destinations around the world. Its flightcrew members are on duty at night as a regular part of the job, certainly more so than for scheduled domestic carriers, to whom the NPRM also applies. Yet the NPRM makes no distinction between scheduled and nonscheduled carriers. Although the agency has acknowledged the concerns that cargo carriers have raised regarding the severe restrictions in the NPRM (75 Fed. Reg. 55,867), it does not meaningfully address those concerns. The effect will be increased costs, diminished service, and the impairment of Southern's business. *See* Part I, *supra.*

3. The NPRM Ignores The Number of Routes And Longer Hours Per Flight That Nonscheduled Carriers Fly

The NPRM is also disproportionately harmful to smaller, nonscheduled carriers because they are spread out across a vast customer network, and thus there is no opportunity to provide redundant aircrews to cover the needed reserve at all of their locations. Nonscheduled carriers are responsible for a very small proportion of the actual *number* of overall *flights*; indeed, in

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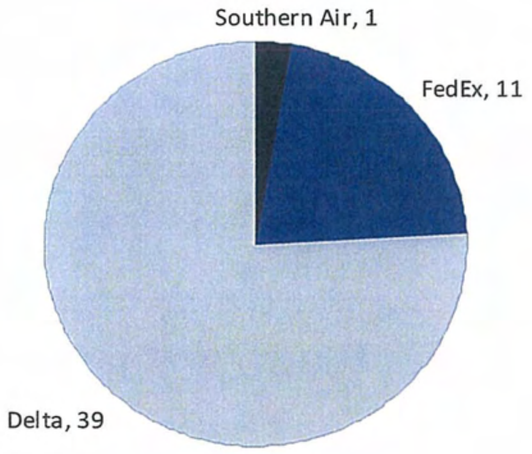
[6] Data from NTSB Aviation Accident Database & Synopses, http://www.ntsb.gov/ntsb/query.asp. In the one fatigue related accident, the aircraft experienced a hard landing while carrying 168 military personnel returning from Iraq. The aircraft experienced "substantial damage." The first officer reported a serious neck injury. Eleven other crew members and flight attendants reported minor injuries. None of the passengers reported any injury. Along with fatigue, the NTSB cited illness and fragmented training as other possible causes.

2009, nonscheduled flights were only about 1.7% of the number of total flight cycles. *See* Gillen Decl. and supporting exhibits (Spreadsheet, T1-00 Data U.S. Carrier Domestic and International Segment for 2009); Chase Decl. ¶ 24.) But nonscheduled carriers flew a much higher proportion of the flight *routes*. In 2009, nonscheduled operators flew 59.7% of the nearly 30,000 routes flown (origin-destination combinations)—nearly the same proportion as scheduled carriers (with 61.8%). *Id.* This data shows that as compared with scheduled carriers, nonscheduled carriers cover an inordinate amount of the world's air routes relative to their size and total capacity, which necessitates a highly dispersed operating model requiring greater efficiency and highly strategic management of crew resources.

Carrier	Routes	Flights	Pilots	Unique Locations	Pilots per Location
Southern Air	508	2,704	276	190	1
FedEx	17,739	275,963	4,472	409	11
Delta	16,501	504,475	10,790	277	39

Pilots per Unique Destination



As a result, nonscheduled carriers like Southern cannot respond to delays with new crews like scheduled carriers. Even without the added burden of the NPRM, this is an issue for Southern, but the NPRM greatly exacerbates the problem. Under the NPRM, a crew must be removed from short-call reserve after 14 hours. A larger scheduled carrier can adapt to this restriction because most of its reserve pilots are stationed at the carrier's few hub locations, and the large carrier can have crews available on a rolling schedule such that a crew is always ready to fly. This is impossible for nonscheduled carriers to implement. Southern does not have a single hub where multiple pilots are in short-call reserve. Even if it did, Southern's pilots and aircraft sit in reserve at customer locations, not at the hub.

Occasional unavailability of a pilot to fly an aircraft is not a new problem. Even under the current rules, a pilot may be sick or report to the schedulers that he cannot fly for other reasons, and Southern always adapts to that situation. Generally, if the pilot is not available for an extended period of time, Southern will fly in another pilot to cover the mission. This causes some delays, but it is the nature of the business. This problem will be greatly magnified by the NPRM. Currently under Southern's CBA, aircrew can be on reserve for up to six days. Most problems that arise extending a mission beyond these six days allow plenty of time for Southern to respond with a new aircrew. When the reserve time is cut down to 14 hours, Southern will face worse problems, as it could not even accommodate relatively short delays without putting the crew back into a full night's rest, thereby extending the delay. Due to the perishable and time-sensitive nature of much of the cargo delivered by Southern, this will not be acceptable for the majority of its clients.

Furthermore, the NPRM is also disproportionately harmful to nonscheduled cargo carriers because nonscheduled cargo carriers on average operate longer flights than scheduled carriers. (Chase Decl. ¶ 22.) Southern reviewed data for the consecutive fifteen month period ending June 30, 2010 from Form 41, Schedules T100 and T100(f) Air Carrier Data obtained from Research and Innovative Technology Administration, Bureau of Transportation Statistics. (*Id.*) Based on the data, nonscheduled cargo carriers have an average flight time for international and domestic flights of 3.34 hours per flight while scheduled carriers have an average flight time of 1.74 hours. (*Id.*) Moreover, Southern's average flight hour to cycle ratio for 2010 for domestic and international 747 operations is 5.42 and 777 operation sis 7.72, both of which are many multiples over scheduled carriers average time and significantly higher than the average for the nonscheduled cargo carrier market. Nonscheduled cargo carriers longer average flight time means that they will have significantly less margin in complying with flight and duty hours for more of their flights than scheduled carriers. The issue is even worse for Southern since its average flight time exceeds even its own industry group by many hours.

Finally, as explained more fully below, the impact of the NPRM may be to require the creation of overseas hubs and displace U.S.-based crews with foreign-based crews, and eliminate the "home base" system that Southern's flightcrew members enjoy. *See* Part II.E, *infra*.

4. The NPRM Makes No Allowance for Flight Delays Beyond The Control Of Nonscheduled Operators

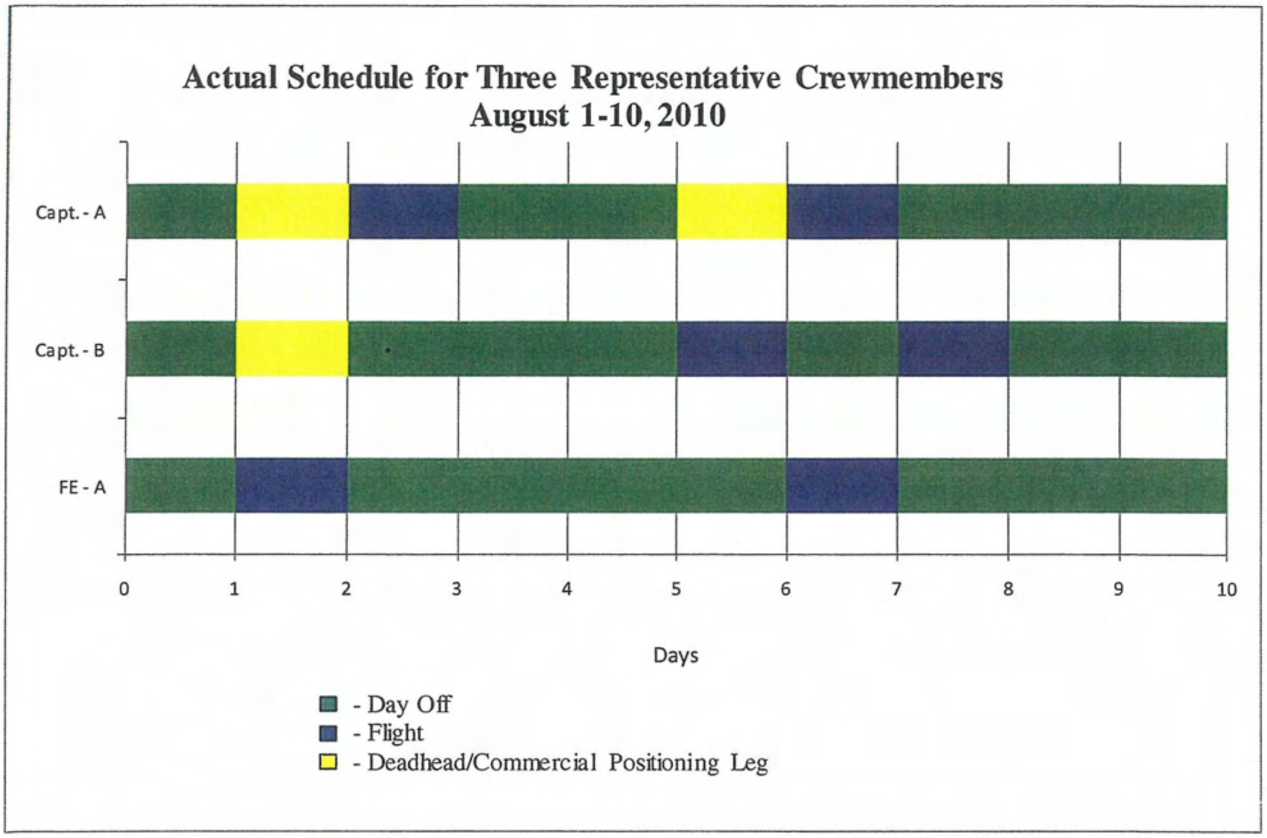
The proposed rule imposes various restrictions that will disproportionately affect nonscheduled carriers, because they are more prone to operational delays outside of their control. The NPRM permits very limited extensions in flight duty times to handle unexpected delays—generally no more than two hours, and limited to a small number of instances over a short period. NPRM § 117.15(c). These extensions are inadequate to account for the conditions that Southern faces. Indeed, 39.2% of delays at Southern are beyond its control, including customer and airport delays, and it is already placed below passenger carriers and other carriers in terms of priority for services at airports, including groundbased services. *See* Part I, *supra*. The NPRM subjects Southern to the same restrictions as passenger carriers but makes no allowance for this systemic problem.

Furthermore, as an on-demand operator, Southern commonly experiences delays of several hours or more as its customers change their own schedules. This includes delays in obtaining and loading cargo, and delays unique to certain cargo (*e.g.*, perishable items, livestock, and other cargo with temperature requirements or other necessary conditions). *See* Background, *supra*. Under the proposed rule, Southern would be faced with two untenable options. First, Southern could decline to accommodate customer changes; however, this would undermine much of the value of Southern's business of on-demand operations, namely, to offer clients *flexibility* in arranging their flights. Second, Southern could refresh the aircraft with new flight crews or augment the flight crews to address the delays. But the cost of these augmenting measures, even where possible, is enormous and extremely burdensome to Southern. *See* Part I, *supra*.

B. The NPRM Is Premised On Insufficient Data, Particularly As To Nonscheduled Operations

The data upon which FAA relies is wholly insufficient to support the application of the rule to nonscheduled carriers. *Lloyd Noland Hosp.*, 762 F.2d at 1568. FAA has paid scant attention to the environment of nonscheduled operations, overlooking the long rest periods that Southern's flightcrew members receive after conducting flight operations. The science supporting the NPRM simply does not justify treating Southern's operations identically to those of scheduled carriers. On the basis of these deficiencies alone, the courts would likely set aside the NPRM on review. *See, e.g.*, *Bosworth*, 437 F.3d at 825-26 (flawed data tainted the Forest Service's calculations); *Heckler*, 760 F.2d at 1467-69 (rejecting an agency formula that was based upon a flawed study).

As shown in the chart below, Southern's flightcrew members typically receive long, often very long, rest periods after conducting flight operations:



Actual Schedule for Three Representative Crewmembers
August 1-10, 2010

In developing the proposed rule, the agency relied upon presentations from medical experts about the state of scientific research "on sleep, fatigue, and human performance." 75 Fed. Reg. 55,854. The agency supposedly considered various studies on fatigue issues, and provided a detailed bibliography of the available literature in the agency docket. *See* U.S. DOT/FAA – Flight, Duty and Rest NPRM Scientific Bibliography, FAA Docket No. FAA-2009-1093, Doc. ID No. FAA-2009-1093-0002. But the science upon which the agency relied does not support the application of the NPRM to nonscheduled carriers like Southern. On the contrary, the fatigue studies that FAA utilized do not address Southern's model of flight operations, in which flightcrew members work for longer flight segments but are then provided with lengthy recovery times—much longer recovery times than crew members on scheduled flights. *See* Background, *supra*. FAA appears to recognize the severe limitations of the science applicable to nonscheduled carriers, *see* Fed. Reg. 55,857, but its reasons for thereafter failing to address nonscheduled carriers' specific needs—that "[f]atigue factors . . . are universal," and that "the historical distinction between the types of operators has become blurred," *id.*—are woefully insufficient. That there may be some superficial overlap between scheduled and nonscheduled carriers, *e.g.*, that both operate at night, *see id.*, does nothing to alter the fact that nonscheduled operations are fundamentally different and afford the operators of nonscheduled flights longer recovery times.

Moreover, FAA has failed to account for scientific research supporting the safety of Southern's nonscheduled operations and system for fatigue management. In research sponsored by the Aerospace Medical Association ("ASMA"), Dr. John Caldwell explains that even current uniform limitation on flying hours are arbitrary and not consistent with modern research. John A.

Caldwell et al., *Fatigue Countermeasures in Aviation*, 80 AVIATION, SPACE, & ENVT'L MED. 1, 34 (2009) (included in the agency's scientific bibliography). "[S]uch prescriptive approaches do not address inherent sleep and circadian challenges nor do they provide operational flexibility." *Id.* Dr. Caldwell's study shows that current FAA flight duty limitations fail to account for varying circadian rhythms, flight durations, and job demands, among other issues. To remedy this problem, Dr. Caldwell suggests that a scientific-based FRMS be developed. *Id.* Nonetheless, by heeding only some of these cautions and inexplicably adding new, equally arbitrary rules, FAA has never addressed the true shortcoming in the current rules.

Examples of where the NPRM ignores the best available scientific information abound. For example, in addition to adapting flight duty limits to circadian rhythms, Dr. Caldwell provides evidence in favor of authorizing zolpidem as a hypnotic to aid in achieving required rest following flights spanning multiple time zones. *Id.* at 34, 41. Other studies show that longer rest periods allow crewmember to be better rested to handle longer flight durations. Nicole Lamond et al., *Do Short International Layovers Allow Sufficient Opportunity for Pilots to Recover?*, 17th Working Time Society Symposium, Hoofddorp, 2005 ("[I]nternational layovers involving at least two full nighttime sleep opportunities appear to provide sufficient opportunity for the flight crew to obtain adequate restorative sleep to reverse the effects of fatigue associated with international flight.") (included in the agency's scientific bibliography). For reasons it does not explain, FAA chose to propose a rule that adapts to circadian rhythms by decreasing flight duty time according to the flightcrew member's window of circadian low ("WOCL"), *see, e.g.*, 75 Fed. Reg. 55,855, but FAA chose not to extend flight duty times after crews have received more than the minimum required rest period.

Dr. Caldwell's criticism of the current rules applies equally to the NPRM, which glosses over the complexity of the scientific research. The NPRM's more restrictive set of rules are equally prescriptive in their approach but still fail to "address inherent sleep and circadian challenges" or "provide operational flexibility." With science that the NPRM admits is incomplete, FAA seeks to impose new rules that are so prescriptive that they no longer allow individual carriers to adapt the rules to the varying demands of their business through the collective bargaining process. *See* Background, *supra*, (discussing examples of how Southern, through the collective bargaining process, has adapted the current duty rules to allow greater than the required rest opportunities in ways that work best within its business model).

Other commenters, including NACA and CAA, also highlight the deficiencies in the science supporting the NPRM. As both of these organizations discuss in greater detail in their comments and supporting materials, the science upon which the agency relies does not account for the realities of nonscheduled cargo flights, and in particular, does not support restrictions on flight time. Because such restrictions are, in all events, unnecessary in light of the flight duty period restrictions in the NPRM, they should be removed. See *infra* Part IV.

Advances in sleep science may provide some reasons to rethink aspects of the agency's regulations relating to flight and duty times, but the science does not justify the sweeping, "one-size-fits-all" approach that the agency has taken in the NPRM. FAA recognized that blanket rules may not make sense when it exempted part 135 operators from the NPRM. 75 Fed. Reg.

55857. By the same rationale, FAA should have exempted nonscheduled cargo carriers, or at least adapted the rules to address their unique business model. *See* Part IV, *infra*.

C. FAA Fails To Consider The Harm Caused To Southern As A Small Business

FAA is bound to, but has not, given due consideration to the effect of the NPRM upon Southern and other small businesses. The agency has therefore not given adequate "consideration [to] the relevant factors" governing its decision to proceed with the NPRM, *Overton Park*, 401 U.S. at 416, making the proposed rule vulnerable on judicial review.

1. The NPRM Disproportionately Affects Southern As A Small Business

As a small business, Southern will be disproportionately affected by the NPRM. Southern employs slightly fewer than 400 flightcrew members, and in total Southern has approximately 725 employees. Therefore, as defined by the Regulatory Flexibility Act of 1980, 5 U.S.C. §§ 601-612 ("RFA") and 13 C.F.R. 121, Southern qualifies as a small business. The NPRM admits that small businesses will be disproportionately affected by the proposed rule, but does little to mitigate this impact. 75 Fed. Reg. 55882.

Under the RFA, FAA must consider the impact of its proposed rulemaking on small businesses. FAA must perform an initial regulatory flexibility analysis, which includes a description of any significant alternatives to the proposed rule that would minimize any significant impact on small entities. 5 U.S.C. § 603.[7] If the agency fails to make this required analysis, "a court may order an agency 'to take corrective action consistent with' the RFA and APA, including remand to the agency." *Envtl. Def. Ctr., Inc. v. U.S. Envtl. Prot. Agency*, 344 F.3d 832, 879 (9th Cir. 2003). *See, e.g., U.S. Telecom Ass'n v. FCC*, 400 F.3d 29, 42-43 (D.C. Cir. 2005); *S. Offshore Fishing Ass'n v. Daley*, 995 F. Supp. 1411, 1437 (M.D. Fla. 1998); *Nw. Mining Ass'n v. Babbitt*, 5 F. Supp. 2d 9, 15-16 (D.C. Cir. 1998).

While FAA did include a perfunctory RFA determination and analysis, FAA's analysis is wholly inadequate, given its recognition that the NPRM is "likely to have a disproportionate economic impact on small entities." 75 Fed. Reg. 55882. FAA gives a cursory analysis of the extent of this impact. For example, under the business closure analysis, FAA asserts that "changes to crew schedules are difficult to assess." In this case, Southern has determined that the NPRM will likely need to increase its crew force by nearly 80 percent—an astronomical impact. Even if FAA did not have the same data the was available to Southern, it should have been abundantly clear that the impact will be severe. FAA further dismisses the need for such an analysis by suggesting, without any foundation, that "upswings in traffic demand or declines in

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[7] "The analysis shall discuss significant alternative such as –

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and

(4) an exemption from coverage of the rule, or any part thereof, for such small entities."

5 U.S.C. § 603(c).

the price of fuel quickly improve the bottom-line." This absurd conclusion is clearly inadequate under the RFA.

Unlike FAA, Southern is convinced that the NPRM will have a very harmful impact on the company's ability to compete and remain in business. As discussed in Part I, *supra*, Southern has analyzed the data and determined that the NPRM will likely create severe burdens for Southern's business.

2. FAA's Proposed Measures To Minimize The Impact On Small Businesses Are Inadequate

FAA considered two measures to minimize the impact on small businesses. First, FAA states that it considered extending the compliance time but determined that it was too risky to delay implementation any further. The agency omits to mention that carriers have been operating under the current crew duty and rest rules for nearly 80 years with an ever increasing safety record. FAA has been considering changes to these regulations since at least *1992*. *See* Caldwell et. al., at 30; 57 Fed. Reg. 26685. The sudden rush to implement new rules is indefensible, given the harm to small business.

The second measure, which FAA suggests it adopted, was to refrain from expanding the rule to part 135 operators. It is small consolation for the small businesses that will be so severely impaired by the proposed rule to know that certain other small businesses will not be. Particularly given the similarity between part 121 and part 135 on-demand operations, as discussed in the NPRM, it is difficult to see how the distinction is relevant. A much more relevant distinction exists between scheduled and nonscheduled carriers. FAA should exclude small business, *nonscheduled* cargo carriers in the same way that it excluded part 135 operators. This will allow FAA and the industry to study the impacts of the regulation as it affects scheduled large carriers, which may be able to absorb the costs, prior to imposing the regulation on nonscheduled small businesses.

D. The Proposed Rule Would Have A Negative Impact On U.S. Military Efforts And Worldwide Humanitarian Operations

Southern conducts extensive operations around the world to assist the U.S. military and myriad aid organizations, often in troubled geographic areas or at disaster sites. FAA purports to have accounted for some of these concerns, but as explained in more detail below, it has not given them due consideration. *Overton Park*, 401 U.S. at 416; *State Farm*, 463 U.S. at 43. On the contrary, the NPRM will make it vastly more difficult for Southern to support the important efforts of military and aid organizations, which are among the most in need of the flexibility that Southern can provide.

1. The NPRM Will Greatly Increase The Cost Of Civilian Airlift Provided In Support Of Military And Humanitarian Operations

The proposed rule will have a negative impact on the ability of cargo carriers such as Southern to support global military operations. The military heavily relies upon private industry to support its operations. In fact, during a major war, commercial carriers like Southern are relied upon to carry *93 percent* of DOD's passenger and approximately *37 percent* of DOD's cargo requirements. *See* Congressman James L. Oberstar, Opening Statement to the Subcommittee on Aviation, The Economic Viability of the Civil Reserve Air Fleet Program (May 13, 2009), *available at* http://transportation.house.gov/News/PRArticle.aspx?NewsID=911. The proposed regulations will have a significant negative impact on this crucial civilian infrastructure that supports military operations.

Many of the military airlift operations require cargo to be delivered to remote and inhospitable locations, which means the aircraft are required to be repositioned following delivery of the cargo to another location for reloading. For example, aircraft making deliveries to Afghanistan are generally redeployed to locations in Asia immediately after completing the delivery. Due to the length of the flights involved, the proposed rule would no longer permit U.S. flagged aircraft to complete these missions. As many military airports do not have ramp space for the aircraft to remain while the crew rests nor do they have available facilities for resting civilian cargo crews, these missions will now require an additional stop at a location with no real purpose; the stop would simply be required in order to provide a location for the crew to rest. In fact, most of the stops will require the aircraft to backtrack, hardly an efficient use of resources. This additional stop will greatly increase the cost of these missions, and may threaten the continued feasibility of many of them as well.

Even where a stop is not required, other issues will increase the cost of military support missions. In military locations that do have additional room to accommodate civilian aircrews, the proposed rule will force the military to bear additional burdens of housing and protecting civilian flight crews. In addition, the military will be forced to dedicate ramp space and adequate protection for civilian aircraft while the crew is rested or acclimated to the new time zone. Other military routes that can currently be flown by non-augmented crews will require augmentation under the proposed rule. This needlessly increases costs of the cargo delivery on military missions.

2. The NPRM Will Decrease The Flexibility Of Civilian Airlift Provided In Support Of Military And Humanitarian Operations

The proposed rule will also limit Southern's flexibility to provide airlift to the military. Because the proposed rule requires reserve time to be considered in the flight duty time calculation, crews will have a much more limited capacity to sit in reserve prior to flying a mission. This will limit the ability of cargo carriers such as Southern to accept and operate missions on short notice or to delay missions when the cargo is not ready for transport as scheduled. Flexibility is the crux of nonscheduled airlift operations, such as that provided by Southern, and is essential to many high-priority military missions. With severely limited ability to provide flexible scheduling through crews sitting in reserve, the military will lose a great service that it is currently provided by Southern and other similar carriers.

The proposed rule will impair the quick response needed for humanitarian responses to natural disasters and other critical global concerns. While the proposed rule does include a limited exception for emergency and government sponsored operations, this will not suffice.

The proposed rule treats the emergency as independent of the airlift requirement; they consider only situations that arise *after* the mission has departed and the crew finds itself unable to complete the flight within the scheduled flight duty period. The emergency exception in the NPRM merely allows the crew to complete a few missions that have been extended due to unforeseen or emergency situations.

Moreover, the NPRM completely fails to address how military aircrews can safely fly these missions with much longer crew duty days. The NPRM fails to consider the flexibility required for contingency or emergency operation supported by civilian carriers. The NPRM mentions the discrepancy that military crews flying these missions will have a 16 hour flight duty period, but fails to note that the military duty period is extended to 24 hours for an augmented crew. For military and humanitarian missions, such as the extensive airlift required for the recent Hurricane Katrina operations or Haiti relief operations, the military relies extensively on putting crews into reserve or alert status, who are called to fly only after the cargo is loaded and will be ready for departure upon crew arrival. Military aircrews can maintain this alert status for 48 hours, and this 48 hour limit is routinely extended to as much as 120 hours. The NPRM places an arbitrary limit of 14 hours on similar alert status for U.S. civilian flight crews. Additionally, the time spent on alert prior to being called is not considered when calculating the flight duty period for a military crew, but the NRPM would limit civilian flight duty periods even further based on time spent in short-call reserve. These restrictions will significantly hamper military capabilities to respond to emergency military and humanitarian operations.

Nonscheduled cargo airlift is the backbone of the CRAF airlift. A recent review by the Congressional Budget Office reported that the vast majority of military peacetime airlift was carried by small-sized charter air cargo carriers, such as Southern. Letter from Peter R. Orszag, Director of the Congressional Budget Office (Oct. 9, 2007), *available at* http://www.cbo.gov/doc.cfm?index=8656&type=0. The NPRM threatens to drive these small air carriers out of business, with only foreign carriers remaining in the on-demand airlift business. In short, the CRAF and other military contract airlift will be permanently and severely impacted by the loss of small U.S. based cargo carriers. This will greatly impact the ability of the military to respond quickly to military and humanitarian crises around the world. The military is being increasingly called on to support these type of short notice and constantly changing operations, and the military heavily relies on civilian carriers such as Southern to do so. The NPRM would severely hamstring these operations.

E. The Proposed Rule Would Have A Negative Impact Upon The U.S. Economy

The agency recognizes that it must also take into account the economic effects of its decision, including the relative costs and benefits of the NPRM. *See, e.g.*, 75 Fed. Reg. 55,876. But the proposed rule appears to "run[] counter to the evidence" about its economic effects. *State Farm*, 463 U.S. at 43. For several reasons, the proposed rule will be harmful not only to Southern's crewmembers, but also to all other U.S. participants in the on-demand sector, as businesses shift their bases of operation abroad and hire employees from outside of the U.S.

1. The NPRM Will Reduce Benefits Currently Available To Southern's U.S. Crewmembers

One of the benefits that Southern currently offers to its flightcrew members is the ability to choose their own home base. Southern considers the aircrew member to be based at the closest international airport to his/her home. With the implementation of the proposed rule, this benefit will no longer be feasible. The scheduling requirements of the proposed rule are onerous enough that planning for crews with a common home base will be difficult. Additional factoring in of the various locations where a given crewmember may decide to live will be impossible. Not only will scheduling requirements force Southern to control where its pilots are based, but many of these pilots will be required to be permanently based at international locations. Southern would be compelled to abandon its "home base" system and hire flight crew members from outside of the United States. This trend will have a negative impact on the already struggling U.S. pilot workforce.

The proposed rule puts significant weight on the time zone where a pilot is acclimated or where the pilot is based. Aside from the questionable science behind this consideration, the rule would have a significantly negative impact on the job market for U.S. pilots. Airlines and air cargo carriers operating on a global scale will be forced to base pilots at international locations in order to take advantage of longer flight duty periods. While the proposed rule will undoubtedly increase the demand for pilots, that demand will change the shape of the pilot career field as more pilots are based at international locations and more pilots are hired directly from foreign countries.

2. The NPRM Will Create Difficulty For Small Nonscheduled Carriers In Training And Retaining Qualified Crewmembers

As a result of the NPRM, most or all carriers will need to increase their crew force. Beyond adapting to this boost in the required number of pilots and flight engineers, small nonscheduled carriers like Southern will lose significant numbers of flight crew who will likely leave for higher paying jobs at larger scheduled carriers. Without the ability to compete with soft benefits such as home basing, and without the operating budget to compete directly on salary, Southern and other small carriers will be left with little incentive to use to dissuade pilots from making these lateral moves.

This will force Southern to simultaneously increase the size of its overall crew force while replacing many of its senior pilots, leaving the company with a woefully inexperienced and understaffed flightcrew. Southern will be forced to train and integrate new flightcrew members at an unprecedented rate. This young crewforce will magnify the already identified scheduling nightmare that Southern will face. Current FAA regulations and good practice restrictions dictate that pilots not be crewed together when they each have less than 100 hours time in type; the current FAA rule is 75 hours, but Southern's CBA is more restrictive. With the expected loss of senior pilots to larger carriers, this promises to be a significant limitation in crewforce utilization. Even more daunting is the more restrictive 250-hour time in type limit for flights contracted by Air Mobility Command ("AMC"), the military command that coordinates cargo and passenger airlift. Such a limitation is particularly harmful to Southern, due to the large number of operations that it conducts for the military.

3. Contrary To U.S. Economic Policy Of Promoting U.S. Competition In International Markets, And Specifically International Air Transportation Markets, The NPRM Undercuts Southern's Primary Business Advantage—Flexible Cargo Airlift

The unique service of on-demand operators depends on their flexibility. The proposed rule severely undercuts the service that they can provide to their customers, and radically limits Southern's ability to provide this flexible transport for delicate and time sensitive cargo. Customers would have no choice but to switch to non-U.S. competitors operating out of the former Soviet Union, Asia, and the Middle East, that are not bound by the FAA's overly restrictive flight duty time limitations. These overly restrictive flight duty time rules eliminate U.S. carriers' ability to compete in the nonscheduled airlift market without any corresponding guarantee of increased safety.

As such, the proposed rule would run afoul of U.S. economic policy, which seeks to ensure that U.S. businesses have an opportunity to be at least equally competitive with their foreign counterparts. 49 U.S.C. § 40101(b) states that it is in the public interest to encourage and develop an air transportation system that is "provided by private enterprise and responsive to—(A) the present and future need of shippers; (B) the commerce of the United States; and (C) the national defense." Southern is the model of such a private enterprise. Southern's flexible, on-demand cargo transport represents a growing demand in international commerce. By arbitrarily prohibiting U.S. flagged aircraft and crews from participating in this growing economic market, the proposed rule defeats the identified public interest with no added benefit or measure of safety. This growing market segment will simply shift to foreign carriers who can operate both internationally and within the United States without complying with the proposed rule. This is precisely the type of harmful regulation that section 40101 aims to eliminate.

In passing section 40101, Congress identified several issues that it considered to be essential to the U.S. aviation industry. One of these priorities, as identified in 49 U.S.C. § 40101(e), directs the Secretaries of State and Transportation to "strengthen[] the competitive position of air carriers to ensure at least equality with foreign air carriers, including the attainment of the opportunity for air carriers to maintain and increase their profitability in foreign air transportation." 49 U.S.C. § 40101(e)(1). The statute also requires the Secretaries to "promot[e], encourag[e], and develop[] civil aeronautics and a viable, privately-owned United States air transport industry." 49 U.S.C. § 40101(e)(10). The global economy increasingly demands just-in-time delivery and ubiquitous availability of products, and this market demand will continue to grow in the future. The NPRM will not eliminate this market demand; it shifts the business to foreign carriers. The cargo will be transported on foreign flagged aircraft, operated by foreign air carriers, employing foreign aircrews simply because the FAA rules prohibit U.S. carriers from competing, a direct contradiction to the directives of 49 U.S.C. § 40101(e).

Congress has also identified a public interest in private enterprise that is responsive to the national defense. 49 U.S.C. § 40101(b). A significant portion of Southern's current business consists of providing airlift for national defense purposes, with the Department of Defense being one of Southern's largest customers. The proposed flying hour limitations will prevent Southern from flying many of these missions even with an augmented crew. As discussed below, the proposed rule will significantly reduce Southern's ability to support national defense missions. While the proposed rule does contain exceptions for defense emergencies, the majority of the missions that Southern flies in support of the military will not fit within this exception.

F. FAA Fails To Justify The Disparate Regulatory Treatment Of Operators Under Parts 121 and 135

Under part 121 of the FAR, FAA never explains the disparate regulatory treatment of nonscheduled cargo operators like Southern, which are subject to the NPRM, and nonscheduled passenger operators (under part 135), which are not. In so doing, the agency fails to account for differences in the business realities of different sectors of this industry, and it chose to regulate for safety reasons *cargo* transport more heavily than *passenger* transport. *Cf. Color Pigments*, 16 F.3d at 1159-61. This makes no sense. In all events, If FAA does ultimately exclude the non-scheduled sector, it should bear in mind the infirmities in the proposed rule discussed in Part IV, *infra*.

The agency recognizes that "fatigue is a universal problem that applies to all types of operations and to all safety sensitive functions." 75 Fed. Reg. 55,857. Furthermore, the premise underlying the entire NPRM is that it is appropriate to *eliminate* regulatory distinctions among different types of carriers and operations, so as to displace the "hodgepodge of requirements" applicable to "domestic operations, flag operations, and supplemental operations." *Id.* The NPRM states that because "part 135 operations are very similar to those conducted under part 121, particularly part 121 supplemental operations," FAA "does not intuitively see any difference in the safety implications between the two types of operations." *Id.*[8] Indeed, the NPRM states that "the part 135 community should expect to see an NPRM addressing its operations that looks very similar to, if not exactly like," the NPRM. *Id.* Because there is no "rational connection" between (1) the agency's determination that operations under parts 135 and 121 are similar and subject to essentially the same concerns about fatigue; and (2) the "choice made" by the agency to apply the NPRM only to part 121 operators, the proposed rule is arbitrary and capricious. *Motor Vehicle Ass'n*, 463 U.S. at 43.

FAA appears to justify the difference in regulatory treatment between part 121 and 135 operators on the basis of economic, rather than safety, concerns. As explained in the "Business Closure Analysis," the agency "did consider expanding the rule to include part 135 operators. All of nearly all of these operators are small entities. As the economic impact may be more severe, the agency wants to study the impact on these operators before proposing a rulemaking." 75 Fed. Reg. 55,882. But this economic distinction is inapposite to the supposed purpose of the NPRM, namely, "to ensure that pilots have an opportunity to obtain sufficient *rest* to perform their duties, with an objective of improving aviation *safety*." 75 Fed. Reg. 55,852 (emphases added).

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[8] FAA "acknowledges there may be less overall risk to the flying public in part 135 operations than part 121 operations." 75 Fed. Reg. 55,857. This supposition is not discussed in any detail in the NPRM.

With respect to safety, as discussed above, FAA simply has no evidence that its measures would improve safety for nonscheduled cargo carriers. There is no accident history for nonscheduled cargo carriers that isolates fatigue as a factor. It may well be that this is so because of the nature of nonscheduled cargo operations that generally provides extra rest between duty periods and much more rest overall than other operations and/or because of the fatigue mitigating measures that nonscheduled cargo carriers have taken. But, in any event, there is simply no evidence that the NPRM would increase safety in the nonscheduled cargo sector in any way.

With respect to FAA's economic rationale, the proposed rule is arbitrary and capricious because the agency gave insufficient attention to "important aspect[s] of the problem" addressed in the NPRM, *Motor Vehicle Mfr. Ass'n*, 463 U.S. at 43, namely, the effect upon nonscheduled carriers like Southern, and the ensuing harm to Southern's clients. FAA declined to include part 135 operators in the proposed rule because of the harmful "economic impact." 75 Fed. Reg. 55,882. But as explained in Part I, *supra*, the impact is more severe for Southern; indeed, the proposed rule would be extremely significant. FAA should either carve out the nonscheduled sector for a separate rulemaking or withdraw the rule pending a more thorough investigation of the economic harm to the nonscheduled sector.

G. The NPRM Inappropriately Shifts To Carriers The Flightcrew Members' Obligation To Monitor Symptoms Of Fatigue

FAA has failed to show a "rational connection between the facts" about fatigue "and the choice made" to place such heavy monitoring burdens on certificate holders. *State Farm*, 463 U.S. at 43. The proposed rule contains several provisions relating to the procedures that carriers must follow to ensure that flightcrew members are fit for duty. The certificate holder may not permit a flightcrew member to begin flight duty if he or she is "too fatigued to safely perform his or her assigned duties *or* if the certificate holder *believes* that the flightcrew member is too fatigued . . . ." NPRM § 117.5(b) (emphasis added). Certificate holders "must evaluate the flightcrew member for fitness for duty" when "notified of possible flightcrew member fatigue." *Id.* § 117.5 (e). In that circumstance, the certificate holder must ensure that the apparently fatigued flightcrew member is evaluated by a person trained under an FAA-approved "fatigue education and training program." *Id.* §§ 117.5(e), 117.11. Furthermore, "[e]ach certificate holder must develop and implement an internal evaluation and audit program approved by the Administrator that will monitor whether flightcrew members are reporting for FDPs fit for duty and correct any deficiencies." *Id.* § 117.5(g).

In addition to the substantial costs of implementation, these provisions are flawed and would be especially burdensome to nonscheduled carriers. *First*, as discussed throughout these comments, the NPRM creates an entire system designed to provide more opportunity for rest by placing arbitrary limits on duty time, limiting reserve time, increasing what constitutes duty time, and more. But the NPRM provides no corresponding obligation upon *flightcrew members* to moderate their behavior during their increased periods of objective opportunities for rest. Although flightcrew members are nominally obligated to report for work rested and fit for duty, *id.* § 117.5(a), the *carrier* is ultimately responsible for subjecting flightcrew members to examination for fatigue. But it is the flightcrew members who are in the best position to ensure that they are rested and determine whether they are fatigued. Because certificate holders cannot control how off-duty crewmembers spend their time, have no means to enforce rest, and have no objective basis to determine whether a particular flightcrew member is fatigued, the rule is totally illogical.

Second, the NPRM establishes an onerous and misguided scheme of "fatigue monitoring." Certificate holders must now train personnel about various fatigue issues so that they may properly observe—and, if necessary, *relieve from duty*—flightcrew members who appear fatigued. *Id.* §§ 117.5(e), 117.11. But the agency fails to justify the expense and effort of providing laypersons with a "crash course" in the science of fatigue. Indeed, such an arrangement seems at odds with some of the basic premises of the NPRM, *e.g.*, that fatigue is subject to "[i]ndividual variation" (Fed. Reg. 55,855), including various factors that may not be simply observed or measured. Air carriers acting in good faith to comply with the regulations may find themselves the victims of complaints from flightcrew members, who will naturally be reluctant to be subjected to probing inquiries about matters of private concern. FAA provides no meaningful guidance on these issues.

Third, the fatigue monitoring requirements will be especially burdensome for nonscheduled carriers like Southern. As discussed above, Southern's pilots typically have several days of rest between duty periods, and it would be very difficult for Southern to monitor whether its flightcrew members are using their time to rest properly. Moreover, Southern's aircraft and pilots are based all over the world. Flightcrew members are therefore reporting for duty in the myriad locations to which Southern flies, and Southern would now have to train and employ people at each of these locations to examine flightcrew members for fitness for duty and prepare any necessary supporting materials to document a fatigue problem, *e.g.*, where a flightcrew member was excused from duty due to apparent symptoms of fatigue. In other words, to comply with the NPRM, Southern would apparently have to train and hire monitoring personnel across the globe to determine whether flightcrew members are rested and fit for duty. This logistical problem highlights that the NPRM was directed at the operations of scheduled passenger carriers, where such monitoring may be at least feasible, however expensive. FAA, however, appears to have given no corresponding consideration to how this would affect nonscheduled carriers.

H. An Undefined "Flight Risk Management System" Is Insufficient To Cure The Defects In The Proposed Rule

The agency suggests that the concerns raised by Southern and other carriers may be adequately addressed through the implementation of Fatigue Risk Management Systems ("FRMSs"). Under the proposed rule, under certain circumstances, carriers may be permitted to exceed the ordinary flight and duty time restrictions if FAA approves an FRMS to address concerns about fatigue and ensure safety. NPRM § 117.7. Nonetheless, the FRMS mechanism remains deficient in several respects:

- *Cost.* An FRMS must include a number of costly components, and commits the carrier to various reporting requirements, including training and monitoring programs and reports on fatigue-related incidents. Furthermore, to the extent that a carrier could institute an

FRMS on a system-wide basis, as discussed below, the costs of doing so would be staggering.

- *Uncertainty.* The FRMS scheme constitutes a new approach for the agency and for flight regulation worldwide; indeed, FAA recognizes that "[n]o country has adopted FRMS as a regulatory alternative." 75 Fed. Reg. 55,874. Some of the requirements appear to remain in flux, and the Administrator may make changes to the FRMS even after final approval. *See* NRPM § 117.7(c). Furthermore, Southern has no realistic way of gauging whether its FRMS will be approved, and, consequently, whether it can continue to offer the same services to clients.

- *Limited Scope.* The agency appears to allow for the possibility that the FRMS could apply to all of a carrier's operations (75 Fed. Reg. 55,874), but it is unclear whether such an arrangement could be cost effective or feasible from a regulatory standpoint. In its Response to Clarifying Questions about the proposed rule (at page relating to § 117.7 of the NPRM), FAA states that "FRMS is a more stringent concept" than the Fatigue Risk Management Plans ("FRMPs") required by statute; "for example, an FRMS would be route specific and would require validation." In the same passage, it states that carriers "would likely use an FRMS only for those flights that cannot otherwise be accommodated under the new, prescriptive rules," given the "anticipated cost associated with validating an FRMS." *Id.*

- *Delay.* Even if Southern could absorb the costs of an operations-wide NPRMs, it will take a significant amount of time to be approved and implemented. In its Response to Clarifying Questions about the proposed rule (at pages 6-7, relating to § 117.7 of the NPRM), the agency has explained that it "likely will not implement any [FRMS] approvals until the rule takes effect."

As a nonscheduled carrier flying to 190 worldwide destinations, it would be next to impossible for Southern to isolate particular routes or segments to be covered by an FRMS. Southern requires the *flexibility to add* routes to accommodate the evolving needs of its clients. But Southern would also face a high hurdle to obtain an FRMS to apply to all of its operations. The regulatory scheme is not yet developed and, as the agency recognizes, it will likely be cost prohibitive for carriers to undertake the efforts needed to obtain a system-wide FRMS. Unless these burdens can be alleviated, the FRMS is not an effective means of addressing the needs of nonscheduled carriers.

III. The Proposed Rule May Constitute An Unlawful Taking Of Southern's Property

The full implications of the NPRM are not yet known, but as the analysis above explains, the restrictions that the agency proposes would frustrate Southern's reasonable investment expectations, impair the value of its property, and would likely be devastating to Southern's business. The proposed rule may therefore have the effect of being so restrictive as to constitute a regulatory taking for which the government would be required to provide compensation.

The Fifth Amendment to the United States Constitution holds that "private property" may not "be taken for public use, without just compensation." The takings clause is not limited to "direct government appropriation or physical invasion of private property." *Lingle v. Chevron U.S.A. Inc.*, 544 U.S. 528, 537 (2005). Rather, "government *regulation* of private property may, in some instances, be so onerous that its effect is tantamount to a direct appropriation or ouster—and . . . such 'regulatory takings' may be compensable under the Fifth Amendment." *Id.* (emphasis added). "'[W]hile property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking.'" *Id.* at 537-38 (quoting *Penn. Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922)). Thus, "a categorical rule applies to regulations that completely deprive an owner of all economically beneficial use of her property." *Id.* at 538 (internal quotation marks and citation omitted). Such regulations constitute a taking "per se," for which the government must pay just compensation. *Id.* at 538.

Even if the regulations do not arise to that level, they may still constitute a taking, depending "upon the magnitude of a regulation's economic impact and the degree to which it interferes with legitimate property interests." *Id.* at 540. In that instance, the courts will consider several factors that originated in the Supreme Court's *Penn Central* decision. *Id.* at 538-40; *see Penn Central Transp. Co. v. New York City*, 438 U.S. 104 (1978). As the Supreme Court has explained:

> Primary among those factors are the economic impact of the regulation on the claimant and, particularly, *the extent to which the regulation has interfered with distinct investment-backed expectations*. In addition, the character of the governmental action—for instance whether it amounts to a physical invasion or instead merely affects property interests through some public program adjusting the benefits and burdens of economic life to promote the common good—may be relevant in discerning whether a taking has occurred.

Lingle, 544 U.S. at 538 (emphasis added) (internal quotation marks and citations omitted).

Under these standards, the proposed rule may have so substantial an effect as to arise to a regulatory taking in Southern's case, and perhaps for other carriers as well. *First*, as the financial analysis above shows, *see* Part I, *supra*, the proposed rule would severely impair Southern's business model for conducting worldwide nonscheduled cargo flights. In all events, Southern would likely have to restructure its operations in the face of extraordinarily higher costs. The NPRM is therefore "so severe" as to be "tantamount to a condemnation or appropriation" of Southern's business, requiring compensation from the government. *Rose Acre Farms, Inc. v. United States*, 373 F.3d 1177, 1195 (Fed. Cir. 2004); *see Cienega Gardens v. United States*, 331 F.3d 1319, 1340 (Fed. Cir. 2003) (the claimant must demonstrate "serious financial loss" to prove a taking) (internal quotation marks and citation omitted).

Second, the NPRM would "interfere with [Southern's] distinct investment-backed expectations." *Lingle*, 544 U.S. at 538. Southern acquired its particular aircraft, the 747-200Fs and 777Fs, specifically for the benefits that those aircraft provide for global nonscheduled cargo operations. *See* Background and Part I, *supra*. And the NPRM will lessen the value of these aircraft, since the regulations will impede Southern and other carriers—as well as potential purchasers—from exploiting the aircraft to their full advantages. *Id.* Of course, Southern does not dispute the agency's competence to regulate within its sphere of authority and expertise. But Southern, like other members of the industry, depends upon some reasonable degree of assurance that it can continue to make decisions about acquiring capital without concern that a set of sweeping new regulations will impair, or substantially undermine, those decisions. Because Southern made such decisions "in reliance on a state of affairs that did not include" the new regime proposed in the NPRM, *Loveladies Harbor, Inc. v. United States*, 28 F.3d 1171, 1177 (Fed. Cir. 1994), the NPRM may arise to a taking if left in its present form.

Third, the "character" of FAA's action does not insulate the agency from scrutiny on judicial review. Even to the extent that the proposed rule is ostensibly aimed at promoting the "common good," *Lingle*, 544 U.S. at 538, that is not itself sufficient to insulate government action from a takings claim; few, if any, regulations would disavow that goal. Indeed, the executive branch has long adhered to the view that "the mere assertion of a public health and safety purpose is insufficient to avoid a taking." Exec. Order No. 12630, 53 Fed. Reg. 8859 (Mar. 15, 1998). This is especially so in the context of a proposed rule that adds heavy burdens to on-demand carriers without any corresponding guarantee of increased safety.

Finally, the NPRM may be at odds with longstanding policies of the executive branch relating to the protection of private property rights. Executive Order 12630 directs "[e]xecutive departments and agencies [to] review their actions carefully to prevent unnecessary takings[,] and should account in decision-making for those takings that are necessitated by statutory mandate." 53 Fed. Reg. 8859. Agency action that may run afoul of the takings clause "should be undertaken only in response to real and substantial threats to public health and safety, be designed to advance significantly the health and safety purpose, and be no greater than is necessary to achieve the health and safety purpose." *Id.* For the reasons explained in Part II, *supra*, the NPRM fails these standards because it is based upon insufficient data and extends too far, particularly over nonscheduled carriers, for whom different regulatory concerns are implicated.

IV. If FAA Proceeds With Rulemaking, Any Final Rule Must Account For The Needs Of Nonscheduled Carriers Like Southern

The agency notes the "concerns raised within the ARC by cargo carriers and carriers engaged in supplemental operations that new regulations will disproportionately impact their business models." 75 Fed. Reg. 55,857. Nonetheless, FAA proposes a "one-size-fits-all" approach that covers everything from domestic, scheduled passenger flights to international, nonscheduled cargo flights. In so doing, FAA has abandoned its prior efforts to tailor its regulations to account for the specialized needs of different sectors of the aviation industry, as well as "changing business environments and advances in technology that allowed for longer periods of flight." *Id.*

As the preceding analysis shows, the NPRM is flawed in numerous respects and should be withdrawn entirely, or FAA should carve out the nonscheduled sector for a new rulemaking. However, to the extent that the agency decides to proceed under its current approach, it should, at a minimum, make the following revisions to the NPRM to ensure the continued viability of nonscheduled carriers like Southern:

- *Acclimating.* Many of the provisions in the proposed rule relate to the principle of "acclimating" to a new theater or time zone. *See* 75 Fed. Reg. 55,861 (describing the rationale for requiring crewmember acclimation). In general, "flightcrew members remaining in a new theater for longer periods of time may need to acclimate to the new theater," rather than having his or her duty period calculated according to home base times. *Id.* The agency should remove the requirements relating to acclimating to new theaters. Such requirements are very burdensome for Southern as a nonscheduled carrier operating with long flights around the globe, since its flightcrew members would frequently need to re-acclimate to new theaters before continuing with further flight operations. As explained above, even if there were reliable scientific data demanding such measures, the extended rest periods given to Southern's flightcrew members should be adequate to alleviate concerns about fatigue.

- *Flight Time Limits.* The NPRM establishes flight time limits for unaugmented operations based upon starting times from the crewmember's home base. 75 Fed. Reg. 55,888. But the agency has failed to justify adding such requirements, particularly in the scheme of the NPRM as a whole. First, as the agency recognizes, the rulemaking committee "assumed" that "there would be no daily limit on flight time," since "flight time would effectively be limited to approximately 2 hours less than the FDP," given the need for the flightcrew member to report 90 minutes in advance of flying and remain for 30 minutes doing paperwork after flying. 75 Fed. Reg. 55,862. Nonetheless, FAA has added separate restrictions on flight time per se, and does not adequately explain why the rulemaking committee's view was erroneous, or why the restrictions on duty periods are insufficient to address the fatigue concerns at which the rule is aimed. Second, by tying the flight time limits to the crewmember's home base, the rule will be particularly harsh for Southern, which has flightcrew members operating around the world, and which must operate a significant number of nighttime flights. *See* Background and Part II, *supra*.

- *Reserve Time.* The NPRM counts airport standby reserve time toward the flight duty period and short-call reserve in the cumulative duty time limits. But Southern frequently experiences delays beyond its control, including from client demands (delays in receiving and loading cargo) and preferences given to other carriers with respect to airport services and groundbased services. If Southern cannot keep its flightcrew members on reserve when such delays occur, it will have to refresh crews much more frequently, or simply decline to accommodate changes necessitated by its clients' schedules, or delays in airport servicing. This would substantially burden Southern's business and would be particularly harmful to U.S. military and humanitarian operations. *See* Part II, *supra*.

- *Short Repositioning Legs by Augmented Crews.* Section 117.19 of the NPRM outlines the requirements for operating flights with augmented crews. Subsection 117.19(c)(3) requires that the pilot controlling the aircraft on landing of the last leg of an augmented flight be provided with two hours of rest *inflight* during the final leg of the mission. This requirement is unnecessary and makes otherwise simple missions impossible. This problem is best illustrated by an example.[9]

- In one of its current routes, Southern departs Ramstein AB, Germany on a military contract mission to Dover AFB, DE. The unloading of the aircraft in Dover takes approximately three hours. Due to limited parking for non-military aircraft, the aircraft usually must depart shortly after the unloading is complete. Accordingly, Southern repositions the aircraft to JFK International Airport, NY, a ferry flight approximately 45 minutes in duration. The total time from crew show in Germany until the landing at JFK takes approximately 16 hours. Depending on the time of day to which the crew is acclimated, this mission should be able to be accomplished by an augmented crew under the time limitations of proposed Table C. However, the restriction of § 117.19(c)(3) grinds this plan to a halt.

- Because the repositioning leg to JFK is less than two hours in duration, the pilot landing the aircraft at JFK will not be able to get the two hours of *inflight* rest required on that leg by § 117.19(c)(3). The pilot could get that rest on the flight from Ramstein to Dover, or he could get that rest during the three hours that the cargo is being unloaded in Dover, but that is not sufficient according to the NPRM. Short of holding the aircraft over New York while the pilot sleeps for the full two hours, § 117.19(c)(3) requires Southern to provide an entirely new crew to fly the aircraft from Dover to JFK. Furthermore, due to the time required to load the aircraft at JFK, it is likely that the crew flying this short ferry mission will not have sufficient crew duty time to continue the flight from JFK to its next destination. This means that the requirements of § 117.19(c)(3) alone will require an entire extra crew just to fly a 45 minute, no payload, ferry flight every time Southern flies this common route. If FAA intends to impose the NPRM on nonscheduled cargo carriers, at the very least it should remove the requirement of § 117.19(c)(3), particularly in cases where the final leg of the augmented mission is less than two hours in duration.

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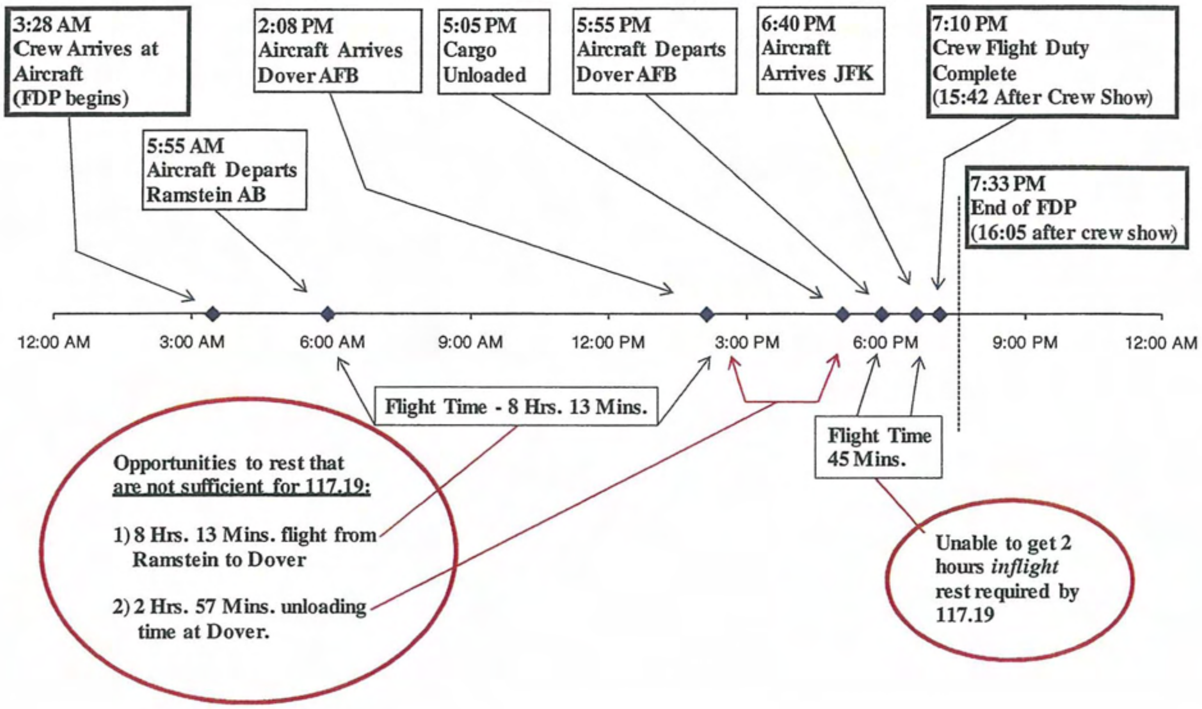
[9] This is merely one example. Because of the unique locations where Southern routinely flies, short ferry repositioning legs such as the one from Dover to JFK in this illustration are a common requirement after the delivery of cargo. Section 117.19(c)(3) will greatly increase the cost of these ferry flights due to the additional crew requirements.

Ramstein-Dover-JFK Mission No Longer Possible Due to Unnecessary Restrictions of Section 117.19



CONCLUSION

Southern shares FAA's concerns for safety and has taken many measures not even required by current regulations to prevent or mitigate flightcrew fatigue. Nonetheless, Southern strongly disagrees with the agency's approach in the NPRM. For the reasons explained above, the proposed rule is logically and legally infirm in various respects, and fails to account for the particular characteristics of the nonscheduled carrier sector. Indeed, the proposed rule threatens Southern's ability to continue its operations across the globe. Southern would welcome the opportunity to work further with the agency to develop standards that ensure safety without so severely impairing the operations of nonscheduled carriers.

Dated: November 15, 2010

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November 15, 2010

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RE: Docket No. FAA—2009—1093; Notice 10—11; RIN 2120—AJ58; Flightcrew Member Duty and Rest Requirements; Proposed Rule

To Whom It May Concern:

We are pleased to submit these comments on behalf of the U.S. Chamber of Commerce (Chamber) in response to the proposed rule (NPRM or proposal) related to flightcrew member duty and rest requirements that was published in the Federal Register on September 14, 2010.[1]

The Chamber is the world's largest business federation, representing the interests of more than three million businesses and organizations of every size, sector, and region. The Chamber's membership includes many businesses in the air transportation industry, including those providing scheduled passenger service, scheduled freight service, and nonscheduled service. The Chamber's membership also includes trade associations broadly representing particular sectors of the air transportation industry. The FAA's proposed rule would have a significant impact on these members should it be finalized.

These comments do not offer a comprehensive response to the NPRM.[2] Instead they focus on a single issue: the failure of the FAA to consider appropriate alternatives that recognize the many different types of operations in the air transport industry.

One Size Does Not Fit All

In rulemaking, not only does one size not fit all, but it's unsafe to think that it can.[3]

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[1] Flightcrew Member Duty and Rest Requirements; Proposed Rule, 75 Fed. Reg. 55,825 (Sept. 14, 2010).

[2] It is our understanding that comprehensive comments addressing the concerns of various sectors of the air transport industry will be filed by Air Transport Association of America, The Cargo Airline Association, and the National Air Carrier Association, among others.

We agree with the sentiments of FAA Administrator Babbit, who uttered these words with respect to this very rulemaking. However, as stated in the NPRM "this rulemaking proposes to establish one set of flight time limitations, duty period limits, and rest limitations for pilots …"[4] In other words, the proposal is a one-size-fits-all approach. Notably, the proposal does not, in any way, take into account the rather significant differences among the various operations in the air transportation industry. As the FAA is well aware, over time and with FAA approval, air transportation companies have developed different strategies to address pilot fatigue consistent with their respective business models. The various strategies differ depending on whether the operations in question are, for example, passenger or cargo, short-haul or long-haul, scheduled or unscheduled. As an example, consider an all-cargo carrier that operates globally, including to remote and conflict areas. Pre-positioning of crews in such locations is simply not possible and quick turnaround is often a necessity. Similarly, the schedules for such operations are typically unpredictable and driven by customer demands. Such a model differs rather significantly from that utilized by large passenger carriers.

The Chamber certainly supports continued efforts to improve safety and address issues related to fatigue. However, we are perplexed by the FAA's decision to ignore these important differences. For the FAA to justify such a departure, we would expect a comprehensive explanation for its approach. The explanation in the NPRM of these issues is limited to the following:

> The FAA recognizes that there are different business models and needs that are partly responsible for the differences in the current regulations. It is sympathetic to the concerns raised within the ARC by cargo carriers and carriers engaged in supplemental operations that new regulations will disproportionately impact their business models. However, the FAA also notes that the historical distinction between the types of operators has become blurred. Cargo carriers conduct the vast majority of their operations at night, but passenger carriers also offer "red eyes" on a daily basis. …
>
> Today's proposal is designed to recognize the growing similarities between the kinds of operations and the universality of factors that lead to fatigue in most individuals. [5]

In other words, the FAA has dismissed the important differences in business models and practices among sectors of the air transport industry with little more justification than the observation that both passenger and cargo carriers fly at night. It very well may be true that there are similarities among all participants in the air transport business. However, very significant differences demand consideration of alternative models.

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[3] FAA Administrator J. Randolph Babbit, *We Can't Regulate Professionalism*, Speech to ALPA Air Safety Forum, August 5, 2009, available at: http://www.faa.gov/news/speeches/news_story.cfm?newsId=10680.

[4] 75 Fed. Reg. at 55,852.

[5] 75 Fed. Reg. at 55,857.

The only other comment in the NPRM related to the FAA's failure to consider alternative approaches is the comment that the "FAA has decided against proposing special rules for all-cargo operations because there are no physiological differences between pilots who fly cargo planes and pilots who fly passenger planes."[6] However, this assertion misses the point. There may be a universality of factors that lead to fatigue in most individuals, but this does not mean that there is only one way to address the issue. Indeed, given the significant differences among operations it is not surprising that different means of addressing crew fatigue and safety have been developed, with FAA approval, with the understanding that physiological needs for rest can be met in different ways.

The Chamber was not involved in the Flight and Duty Time Limitations and Rest Requirements Aviation Rulemaking Committee (ARC) deliberations that occurred in 2009. However, it is our understanding that the ARC process gave inadequate consideration to alternatives proposed by both the Cargo Airline Association and the National Air Carrier Association. It is true that both of these organizations were permitted to attach separate proposals to the ARC's non-consensus recommendations. However, it does not appear from our review of the record that these alternatives have been addressed on a substantive basis at all in the NPRM.

APA Implications

As the FAA may know, section 706(2)(A) of the APA provides that agency rules that are arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law must be set aside. Under this section of the APA, Courts have regularly held that an agency may not take regulatory action without considering an important aspect of the problem or without consideration of alternative approaches. Nor may an agency reverse precedent without an appropriate explanation.

In the landmark *State Farm* case,[7] the Supreme Court held that agency rule would be arbitrary and capricious if the agency:

> Relied on factors which Congress has not intended it to consider, *entirely failed to consider an important aspect of the problem*, *offered an explanation for its decision that runs counter to the evidence before the agency,* or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise. (emphasis added).[8]

The FAA's proposal is not the product of reasoned decision-making as it has entirely failed to consider an important aspect of the problem, namely the vast differences among operations in the air transportation sector. The FAA's failure to properly explain this decision also renders the proposal arbitrary and capricious.

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[6] 75 Fed. Reg. at 75,863.

[7] Motor Vehicle Manufacturers Association v. State Farm Mutual Automobile Insurance Co., 463 U.S. 29 (1983).

[8] *Id.* at 43.

The FAA's actions here are not unlike the *State Farm* case where the agency failed to consider proper alternatives. Likewise, it is also similar to the agency action in *International Ladies' Garment Workers' Union v. Donovan*.[9] In *Donovan*, the D.C. Circuit was faced with a Labor Department rescission of a long-standing rule. In analyzing the Labor Department's proposal, the D.C. Circuit noted that during the rulemaking process, substantial input had been provided to the agency demonstrating a disproportionate impact of the rule in one area. It also observed that alternative proposals had been submitted to the agency to accommodate this impact. In invalidating the Labor Department's rule, the D.C. Circuit noted that:

> In addition to requiring rational consideration of alternatives, the APA demands an adequate explanation when these alternatives are rejected. Hence, we vacated a decision by the Civil Aeronautics Board to rescind certain restrictions on smoking in airplanes because the Board had failed adequately to address alternatives proposed in the comments. … We indicated that while an agency "need not respond to every comment," … it must respond in a reasoned manner to "explain how the agency resolved any significant problems raised by the comments, and to show how that resolution led the agency to the ultimate rule." … The Board's claim that it had in fact considered the alternatives, and its attempt to rely on generalized and conclusory policy considerations as grounds for rejecting them, were inadequate …[10]

The D.C. Circuit concluded that the Department was "required to address common and known or otherwise reasonable options, and to explain any decision to reject such options. [The agency's] complete failure to satisfy these quintessential aspects of reasoned decisionmaking is the primary basis for our decision" to reject the rule.[11]

Like the *Donovan* case, here the FAA has both ignored a key element of the problem, failed to consider known alternatives addressing the problem, and has failed to offer any real explanation of why the alternatives were rejected. The FAA must return to the drawing board and consider these alternatives if it is to move forward with this rulemaking.

Regulatory Flexibility Act

We appreciate the fact that the FAA conducted an initial regulatory flexibility analysis in conjunction with the NPRM. Nevertheless, we note some significant problems with the analysis and we urge the FAA to again revisit these issues should it move forward with the proposal.

Reasons the Rule is Proposed

As an initial matter, the RFA discussion asserts that the "objective of the proposed rule is to increase the margin of safety for passengers travelling on U.S. part 121 air carrier flights."[12] This is a critically important objective, and one that the Chamber supports. However, passenger

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[9] 722 F.2d 795 (D.C. Cir. 1983).

[10] *Id.* at 817-18 (citations omitted).

[11] *Id*. at 818.

[12] 75 Fed. Reg. at 55,881.

safety does not seem to be a relevant objective for flights with no passengers. If passenger safety is the objective of the rule, how does the FAA justify application of the rule to all-cargo operations?

This comment is telling. We assume that the FAA's true objectives in promulgating the rule include passenger safety, but are, in fact, broader. However, it appears that the agency has issued its proposal without considering application of the rule to all stakeholders. This comment is perhaps a simple misstatement, but in our view it is further evidence that the proposal was not drafted with all segments of the air transportation industry in mind.

Disproportionality Analysis

In its disproportionality analysis, the FAA acknowledges that the proposal "would be more difficult to accommodate for operations with small pilot staffs"[13] and that to comply with the proposal an "airline would need to hire and train an additional pilot or reduce the number of operations."[14]

The FAA uses these points to observe that the proposal will have a "disproportionate economic effect on small entities."[15] While true, these points warrant greater discussion as the impact will not only be felt on small entities, but also on communities served by them.

First, it should be noted that there is not an infinite supply of qualified pilots. Nor can an increased demand for qualified pilots be easily and quickly met. From discussions with our members in the air transportation industry, it appears clear that these rules will require air carriers of all sizes to hire additional pilots. While this will be a challenge for all carriers, it will be easier for some than for others. Larger carriers with greater resources may find it easier to meet this challenge and may draw pilots away from less lucrative careers with smaller carriers. What this means is that even before assessing the increased staffing burdens the new proposal may place on small carriers, it is important to note that they will be struggling simply to maintain the same number of qualified pilots as many pilots move to more lucrative positions with other carriers. Smaller carriers, both on the passenger and on the cargo side of the business, will grapple with the difficult decision over which markets can bear increased costs and which operations should be shut down.

Consider the impact that such a decision could have on a small manufacturer of auto parts in a relatively remote location. For this manufacturer, the timely delivery of product to automobile manufacturers, who may utilize just in time delivery to minimize inventory and manage costs, is critical. Too, it may have just in time delivery arrangements with its own suppliers, who could be located virtually anywhere around the world. Increased globalization and decreased costs for moving goods may have contributed to the development and growth of

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[13] 75 Fed. Reg. at 55,881.

[14] *Id.*

[15] 75 Fed. Reg. at 55,882.

this business. But if it is in a relatively remote location and the small air carrier servicing its area decides it is now not cost effective for it to maintain this route, the small manufacturer will suffer serious consequences. It may be that alternatives can be arranged at greater cost (with the increased risk that competitors will be able to operate at less cost, threatening future business), or the lack of alternatives may deal a crippling blow to the business.

We recognize that the Regulatory Flexibility Act only requires an analysis of those small entities directly impacted by the regulation. Nevertheless, an analysis of costs on small entities indirectly impacted is encouraged by the Small Business Administration's Office of Advocacy.[16] Executive Order 12,866 also requires examination of countervailing risks.[17] The bottom line is that development of sound public policy requires a consideration of these factors and the FAA should conduct such an analysis before it proceeds further.

Alternatives Considered

As with the APA, the RFA requires consideration of alternatives. The Small Business Administration's Office of Advocacy summarizes this requirement as establishing "a process for the agency to evaluate proposals that achieve the regulatory goals efficiently and effectively without unduly burdening small entities, erecting barriers to competition, or stifling innovation."[18] Importantly, the "RFA requires the agency to undertake an analysis in order to discover the least costly method of attaining the statutory objectives of the rulemaking agency."[19]

As with the APA discussion above, the FAA failed to consider meaningful alternatives in its initial regulatory flexibility analysis. The analysis cites to three alternatives that it allegedly considered: 1) the status quo, 2) extended compliance time, and 3) expansion to include part 135 carriers, an alternative that in no way serves to lessen burdens on small entities, but instead would impose greater burdens.[20] It then, in a conclusory fashion states that "The FAA has tentatively determined that there are no reasonable alternatives to this rulemaking that would lessen the potential impact on a substantial number of small entities."[21]

In other words, even though the FAA concludes that "the proposed rule is likely to have a disproportionate economic impact on small entities"[22] it did not seriously consider any alternatives that would mitigate the impact on small entities. The purposes of the RFA are

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[16] SBA Office of Advocacy, A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act at 69-70, available at: http://www.sba.gov/advo/laws/rfaguide.pdf.

[17] See OMB Circular A-4 at 26, available at: http://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf.

[18] SBA Office of Advocacy, A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act at 35.

[19] *Id.*

[20] 75 Fed. Reg. at 55,882.

[21] *Id.*

[22] *Id.*

defeated without a good faith consideration of alternatives. Rather than attempt to discover the least costly method of attaining the objective, the FAA appears to have gone through the motions without any real commitment to examining whether other methods of addressing fatigue might be superior. A good start would have been considering proposals made to the ARC by the Cargo Airline Association and the National Air Carrier Association, associations representing a significant number of small entities regulated by the regulations in question. However, these proposals receive no attention in the IRFA.

Conclusion

The Chamber strongly urges the FAA to return to the drawing board and re-evaluate the proposal in light of the very different business models utilized in the air transportation industry today. The FAA's failure to account for different methods to address fatigue and its proposal of a one-size-fits-all approach do not comport with the requirements of the Administrative Procedure Act or the Regulatory Flexibility Act. Moreover, it is simply bad public policy not to fully consider these alternatives.

Thank you for your consideration of these comments. Please do not hesitate to contact us if the U.S. Chamber of Commerce may be of assistance as your proceed to consider this important matter.

Sincerely,

Michael Eastman

Randel K. Johnson
Senior Vice President
Labor, Immigration & Employee Benefits

Michael J. Eastman
Executive Director
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TAB 18

BEFORE THE
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C.

In the Matter of **Flightcrew Member Duty and Rest Requirements** **Notice of Proposed Rulemaking** **FAA Notice 10-11**	**Docket No. FAA-2009-1093**

COMMENTS OF UNITED PARCEL SERVICE CO.

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November 15, 2010

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Declaration of Donald B. Rubin, John L. Loeb Professor of Statistics, Harvard University

Declaration of David Parrott

1. INTRODUCTION

United Parcel Service Co. ("UPS") objects to the proposed new *Flightcrew Member Duty and Rest Requirements.*

The proposed regulations represent a sea change from the long-established regulatory regime for scheduled all-cargo operators that has not only produced a remarkably good safety record but also enabled this critical U.S. industry to lead the global competition. The rules, if adopted, would impose at least $2.67 billion over ten years in massive new costs and operating burdens uniquely on the U.S. all-cargo sector – amounts that were woefully underestimated by the Federal Aviation Administration (FAA). *UPS's compliance costs alone would total between $1.34 billion and $1.80 billion.* The proposal effectively rewrites UPS's collective bargaining agreement with its pilots' union while hobbling the company's finely honed domestic and overseas logistics network. More fundamentally, the rules have little to no safety benefit and may *degrade* safety in several respects.

The NPRM fails the most fundamental tests applicable to agency rulemaking. The predicate of the entire NPRM is a statistical analysis of prior accidents involving pilot error, which the FAA uses to extrapolate supposed safety benefits (i.e., avoidance of accidents) from a radical overhaul of existing rules on fatigue. But thanks to the dramatic advances that have occurred in aviation technology and safety programs in the past decade,[1] accidents involving major U.S. carriers are exceedingly rare, making it crucial to conduct a statistically valid analysis when trying to predict the effect of new regulation. This is especially true as to accidents that involve pilot error because of the complexities of human factors analysis.

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[1] These safety advances include the 65 safety enhancement recommendations of the Commercial Aviation Safety Team (CAST), many of which have been implemented at UPS.

UPS is submitting with these Comments the Declaration of Professor Donald B. Rubin, who has served twice as the Chair of Harvard University's Department of Statistics and has consulted extensively with several U.S. federal agencies.[2] Professor Rubin is regarded by many as the world's leading authority on the application of formal statistics to regulatory interventions that, because of scientific uncertainty, must rely on causal inference. As Professor Rubin explains, the FAA's benefits case analysis was "entirely inadequate" from the start because the agency failed to compare key variables in the very small number of accidents it examined with comparable available data for both safe operations and incidents of self-reported pilot errors. According to his report, the agency, literally, has no way of knowing whether the proposed rules would make any difference at all in improving safety. As a result, he notes, the FAA lacks any basis to substantiate its claims of effectiveness for the NPRM and is left with a "random" or arbitrary regulatory proposal that is the equivalent of: "Randomly choose flights to forbid from taking off because this will reduce total accidents."

The proposed regulations, moreover, are a hodgepodge of new restrictions added to rules imported from foreign civil aviation authorities that lack significant experience in the all-cargo sector. The rules were not based on the "best available scientific information," as the governing statute required, *See* Airline Safety and Federal Aviation Administration Extension Act of 2010 section 212, Public Law 111-216, and the FAA freely admits as much. Most fundamentally, the FAA complains that *fatigue* science, particularly in the aviation arena, is not well developed; but rather than making a real attempt to understand and apply scientific principles for assessing cause and effect, as embodied in the field of statistical analysis, the FAA employed a flawed methodology that seems designed merely to confirm the FAA's preconceived result, rather than

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[2] Professor Rubin's Declaration is attached as Exhibit 1.

to objectively assess whether that result is grounded in science. The FAA also proposes many new requirements that are not supported by any scientific information at all. And where the existing fatigue science conflicts with the envisioned regulations—for example, studies showing increased fatigue associated with "first night" operations—the FAA simply ignores that science. At the same time, the FAA largely discounts crew "self-performance" factors that heavily contribute to pilot fatigue—namely, crewmember commuting habits and failure to properly utilize rest periods—even though they played a key role in the very accidents the FAA relies on. As a consequence, the new regulations will not improve safety. At a bare minimum, the FAA's contrary conclusion is no more than a blind guess.

Even under the FAA's own faulty analysis of costs and benefits, the new regulations would have a *negative* net outcome of almost $600 million. It is remarkable that the FAA would propose such a rule for this industry sector without ever acknowledging that neither UPS nor the other major all-cargo operators have had a fatal accident attributed by safety investigators to fatigue.

The proposed regulations were contaminated by the needlessly rushed review that the FAA initiated in anticipation of the NPRM, including an Aviation Rulemaking Committee (ARC) process (hardly a substitute for meaningful public comment on *later*-proposed rules) that was little more than a charade. Throughout, the agency has treated the all-cargo sector as an afterthought. The FAA has made a pivotal mistake in imposing a "one size fits all" regulation on every air carrier operating under Part 121 of the Federal Aviation Regulations (FARs), ignoring key factual dissimilarities that the agency itself has acknowledged would justify treating all-cargo operators differently from scheduled passenger carriers.

In its rush to judgment, the agency overlooks the extensive, collectively bargained safety practices that UPS and other cargo operators have used successfully for decades to prevent pilot fatigue. Indeed, the rulemaking preamble barely articulates any reason for treating cargo-carrying aircraft the same as passenger-carrying aircraft; the main justification is that "all pilots are human." As a result, the FAA failed to seriously consider alternatives, including a proposal from the Cargo Airline Association, that would have met the FAA's stated objectives without crippling the industry. The result is a rule crafted for the passenger airline industry that does not account for the very real differences between that industry and the cargo industry. And in so doing, the rule imposes massive costs on the cargo industry that, as discussed, the FAA has refused to even acknowledge.

For all of these reasons, and more, this massive new regulatory burden cannot be imposed on UPS and other all-cargo operators under the Administrative Procedure Act, 5 U.S.C. 551 *et. seq.*, and other applicable law.

2. <u>BACKGROUND</u>

a. The UPS Network

UPS operates the world's 9th largest airline with 217 aircraft in service and over 2600 pilots. In addition to UPS's comprehensive domestic operation, UPS serves over 200 countries and territories, and its airline operates to five continents on a daily basis. UPS's core business is express package delivery and logistics. UPS commenced providing air cargo services in 1981 and has managed its own airline since 1988. The airline is headquartered in Louisville, Kentucky, with U.S. domestic hubs in Philadelphia, Pennsylvania, Miami, Florida, Ontario, California, Rockford, Illinois and Anchorage, Alaska. UPS also operates hubs in Cologne, Germany, Shenzhen, China, and substantial operations in several other cities. To connect its network, UPS operates several daily "around the world" flights to locations through point-to-point operations that occur entirely outside of the United States. These segments traverse a significant number of time zones on a single flight. UPS has been successful, and its pilots are among the highest paid, averaging $270,232 per flightcrew member in annual compensation (salary and benefits).

b. UPS Cargo

The composition of a typical UPS payload bears no resemblance to that of a passenger airline. A fully loaded B747-400 freighter may have upwards of 18,000 packages. UPS's typical cargo often includes critically needed medical supplies and pharmaceuticals, and so timely delivery often is, quite literally, a matter of life and death. In some markets the entire payload of a UPS aircraft may consist of highly-perishable goods whose value can be completely destroyed by a flight delay or cancellation. UPS also moves sophisticated, high-value industrial components used to operate critical infrastructure such as power stations and water treatment plants. The consequences of canceled or disrupted UPS flights are not readily comparable to a similar event at a passenger airline.

c. UPS's Business Model and Crew Requirements

The operational model of the cargo express[3] industry vastly differs from the passenger airline business model that the FAA apparently had in mind when formulating this proposal. The FAA points to surface similarities between the two businesses to justify treating them identically. That both passenger and scheduled cargo express airlines happen to fall under the same section of the Federal Aviation Regulations is happenstance—Part 121 long predated the existence of the cargo express industry. The many significant distinctions between these two industries render the proposed regulation completely unsuitable for a cargo express airline like UPS.

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[3] UPS divides its cargo into two types: small packages (in containers) and cargo/freight (on pallets). For purposes of these comments, we use the term "cargo" for both.

The heart of UPS's business revolves around its Next Day Air (NDA) domestic operation, which involves *express overnight* deliveries for which our industry is best known. UPS's domestic network is constructed around provision of this service, which operates each night Monday through Friday. Each week, most crews in the U.S. operate the same flight segments from their outpost city to the UPS domestic hub sort facility in Louisville, Kentucky, returning to the outpost in the early hours of the following day. UPS also operates a Second Day Air domestic operation on a much smaller scale. The Second Day Air domestic operation resembles that of the night schedule, but it occurs during the mid-day hours. In addition, UPS operates several domestic trans-continental flights during the daytime hours.

A key attribute and result of this business model is that pilots in the scheduled cargo express industry fly *significantly fewer hours per month* than their passenger airline peers—a material fact that the FAA has ignored in its proposal. They work fewer hours pursuant to carefully developed work rules and thus are better rested than their peers in the passenger segment. Accordingly, UPS's average daily aircraft utilization per day is also much lower than that of a typical passenger airline.

UPS also operates an international network using a combination of strategically sited regional hubs and long range flight segments. UPS's regional air hubs in Cologne, Germany and Shenzen, China operate in a somewhat similar manner to the U.S. domestic NDA network with flights serving countries in those respective continents. Each aircraft flies into the designated hub around 11:00 p.m. and returns to the origin city several hours later. Neither domestic NDA nor foreign regional hub flights require crew augmentation for intra-theater operations, and this staffing level is critical to their economic viability.

The long haul international operations at UPS consist largely of flights operated with augmented crews connecting the major business centers of the world. These flights typically operate point-to-point with the same crew. Unlike passenger airlines, UPS is able to take advantage of so-called 7th freedom traffic rights between two or more foreign countries that have negotiated liberal cargo air services agreements with the United States. These rights allow UPS to conduct operations between foreign countries without the necessity of a continuation flight to or from the U.S. (discussed in detail below). Within this expansive network, UPS operates some flights with intermediate stops in distant or remote parts of the world, such as Almaty, Kazakhstan (ALA), Mumbai, India (BOM), and Buenos Aires, Argentina (EZE). As a result of this flexible legal framework, UPS need not base its pilots in foreign cities, a circumstance that would require a reassessment if the proposed rules are adopted.[4]

d. UPS's Demonstrated Commitment to Safety and Prevention of Pilot Fatigue

With its core domestic network built on overnight express deliveries for its customers, UPS and its pilots have accumulated extensive experience and have created a proven track record in the safe conduct of nighttime operations. This is reflected in UPS's carefully crafted fatigue-mitigation measures that were negotiated with the Independent Pilots Association and memorialized in UPS's collective bargaining agreement with the Independent Pilots Association, as well as in other UPS policies.[5] These established, proven strategies provide the highest level of safety possible (demonstrably better than those involved in the proposed regulation) while permitting UPS and its employees to thrive in a highly competitive global market.

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[4] A more detailed description of UPS's business operations can be found in the Summary of UPS's operations in appendix I.

[5] A copy of the collective bargaining agreement between UPS and the IPA is attached as Exhibit 2.

UPS's fatigue mitigation program includes several measures governed by the UPS collective bargaining agreement, which must be carefully considered by the FAA in any overhaul of existing regulations:

First, flights operated during the "window of circadian low" are subject to a variety of highly restrictive work rules, triggered by any flight duty period that involves time spent in an Early Duty Window (EDW) of 2:30 to 4:59 a.m.[6] Restrictions applicable to EDW flights include the following:

- Overall duty limits are reduced from 13 hours to 11 hours of scheduled duty.
- The amount of time by which a crew's duty period can be extended—such as for delays due to weather, mechanical, air traffic or sort difficulties—is limited to15 hours.
- All duty must fall within a sixteen hour window, based on the more restrictive of either the earliest report time or the latest release time within a crew pairing.
- No more than four segments per duty period can be flown.[7]
- At least 18 hours of rest is provided between a commercial "deadhead" flight and the commencement of the duty period.[8]
- The pilots must receive increased rest during any layover.[9]
- A bid line that includes an EDW trip may not include any non-EDW trips (allowing the pilots to adjust to the window of circadian low).
- EDW lines may have no more than four reports (or series of trips) per 56-day bid period, and 75% of these lines must be constructed with a minimum of five days off between each series of trips.[10]

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[6] Article 13.A.1 of the Collective Bargaining Agreement

[7] Article13.A.1.i., of the UPS-IPA collective bargaining agreement.

[8] Article 13.A.1.j, of the UPS-IPA Collective Bargaining Agreement.

[9] Article 13.A.5.B, of the UPS-IPA Collective Bargaining Agreement.

[10] Article 13.B.2.c, of the UPS-IPA Collective Bargaining Agreement.

Second, the UPS labor contract regulates trip times to prevent potential disruptions to the circadian rhythm created by swapping daytime and nighttime flying. The "Shift Rule," which confines the 11-hour maximally scheduled night duty period to a 16 hour window common to each of the crewmembers, is designed to ensure they have a stable rest period for the entirety of their pairing.

Third, international work rules have been carefully designed to mitigate crew fatigue through the following restrictions:

- Only one "crossing"11 per duty period is allowed.
- The total number of crossings in a pairing cannot exceed four.
- The flightcrew is provided at least 15 hours of rest prior to any crossing,[12] and for any pairing that has three or four crossings, the crewmember must have 30 hours of rest at some point between the second and fourth crossing.
- A minimum rest of 17 hours is provided for duty periods with 8-12 hours of total flight time.[13]
- Duty limits for augmented crews are reduced for more than two segments, and are capped at three segments per duty period. Segments one and two allow for a fourteen-and-a-half hour duty period while a duty period of three segments can only be scheduled to thirteen-and-a-half hours of duty.[14]

Fourth, special circadian rhythm parameters limit the company's construction of bid lines. The UPS collective bargaining agreement states: "In building trips and bid lines, the Company will follow safe practices to prevent fatigue and circadian rhythm disruptions." In addition, "[t]he Association and Company representatives will attempt to mutually resolve any

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[11] A "crossing" is defined as a duty period that begins and ends with more than 4.5 time hours of difference.

[12] Article 13.A.8., of the UPS-IPA Collective Bargaining Agreement.

[13] Article 13.A., of the UPS-IPA Collective Bargaining Agreement.

[14] Article 14.L.2, of the UPS-IPA Collective Bargaining Agreement.

disagreements concerning safety and circadian rhythm disruptions."[15] The practical result of this is that the company and its union regularly dialog concerning adjustments in crew pairings to avoid creating schedules that might lead to pilot fatigue.

Fifth, through its human factors education program, UPS provides fatigue mitigation training to all of its pilots, containing virtually all of the training components otherwise required by the Congressionally mandated Fatigue Risk Management Plan (FRMP). Indeed, UPS has already adopted most of the components of the FRMP in the absence of a federal mandate and made enormous investments in sleep facilities at UPS's regional hubs without any legal requirement to do so.

Sixth, UPS's FAA-approved Flight Operations Manual includes a policy that specifically addresses fatigue mitigation.[16] The System Chief Pilot manual also requires a uniform management response to all fatigue calls, specifically stating that: "If a crewmember calls Crew Scheduling and informs them that he is unfit to continue safely due to fatigue, he will be put into a contractual crew rest period before being given a new flight assignment or resuming his original line."[17]

Seventh, crew schedulers are trained that if any crewmember claims to be fatigued, they are immediately released from duty (with pay). Follow-up by the chief pilot with the crewmember about their fatigue call typically occurs after rest has been given.

Eighth, UPS provides its pilots with sleep facilities that are far superior to those available to passenger airline pilots. For example, at our principal U.S. hub at SDF, UPS has invested millions of dollars to provide lie-flat single occupancy hotel-room-like facilities with climate

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[15] Article 13.O.1, of the UPS-IPA Collective Bargaining Agreement.

[16] Flight Operations Manual ¶ 14.01.01.07.

[17] UPS System Chief Pilot Manual Policy #115, p. 80.

controls. At other locations (PHL, EWR, BDL, RFD, MIA, ONT and ANC), UPS provides semi-private sleep facilities with beds that are separated with partitions that you would typically see in an office cubical environment. These facilities are sound-proofed, are maintained relatively dark (with night lights to assist when entering/exiting the sleep facility) and are temperature controlled. These facilities are utilized by UPS pilots during the sort process that separates the major segments of UPS's nighttime operations. Likewise, many of UPS's long haul aircraft are equipped with high quality lie-flat bunks or substantially reclined rest facilities.

These strategies have proven to be highly effective and, along with a robust culture and regime of safety, explain why UPS has never had a single accident or incident where pilot fatigue was even cited as a factor in the NTSB report. The fact of the matter is that UPS long ago encountered, analyzed, and effectively mitigated many of the issues that the FAA now seeks address in this ill-considered proposal.

e. Effect of the Proposed Regulation on UPS

The proposal takes no stock whatsoever of UPS's superb safety record and the voluntary measures already implemented that far surpass current requirements. It is perhaps a function of this glaring omission that the proposed regulation would impose massive new burdens on UPS's operations without yielding any identifiable benefit. These proposed regulations are entirely incongruous with the cargo express business model and with fatigue-mitigation strategies already in place as the result of collective bargaining agreements. Indeed, the proposed regulations are a step backwards, insofar as existing regulations acknowledge and reflect some of the differences among and between air carriers' business models. If adopted, these regulations will precipitate a huge drop in UPS's productivity, increasing its costs while reducing its flexibility. They would put UPS and other US scheduled cargo express carriers at a serious competitive disadvantage globally without providing any increase in public safety. In making this proposal, the FAA is seemingly oblivious to UPS's existing fatigue-mitigation strategies memorialized in its labor agreements and would effectively penalize UPS for its good-faith efforts.

There are numerous objectionable components of the proposed regulation, but the most costly and immediately harmful to UPS and all-cargo operators are the following:

- Inability to Extend a Flight Duty Period. Sections 117.15(c) and 117.19(f) of the proposed regulation would prevent an airline from extending a scheduled flight duty period, regardless of whether the crew would ever exceed their maximum flight time or flight duty period limits. That the FAA would elect to limit an air carrier's ability to reschedule their crews based on operational needs—when there is no safety need to do so, much less any scientific foundation to believe there could be—shows just how far the FAA has overstepped its bounds and moved from safety regulation into the realm of labor arbitration.

- Limits on consecutive nighttime operations. This aspect of the rule, contained in Section 117.27, would appear to effectively preclude the continuation of UPS's existing nighttime sort operation by requiring four-hour rest periods between flight segments and would severely disrupt UPS's precisely-tuned inter-modal operation.[18] To accommodate rest breaks of this length, the sort period would have to be extended such that UPS either could not meet its guaranteed service times or would have to move up its established parcel pick up times; neither of these options is commercially feasible. Moreover, these limits will act to undermine safety by increasing the number of "first nights" (where the risk of accidents is statistically the greatest) as pilots will have to work more three-day trips. It would also incentivize certificate holders to build schedules that "flip-flop" night flying with an occasional day flight, which is also counter to safety.

- Strict flight time limitations. These inflexible limitations, contained in Section 117.13, which have no basis or justification in science, eliminate UPS's ability to adjust its operations to changing conditions, such as delays caused by weather, air traffic control, or other unplanned events. No provision is made for the limits to be extended if these conditions occur. The illogic here is exacerbated by the FAA's reliance upon and modification to foreign EU Ops and CAP-371. Each of these regulations abandon the concept of daily flight or block limits in favor of a flight *duty period* concept. The FAA inexplicably elects to adopt the FDP concept and yet retain the daily flight time limits. In doing so, the FAA has eviscerated the logical basis for using such regulations as points of reference. The

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[18] The FAA's proposal restricts to three the number of consecutive nighttime operations (unless a rest period that complies with §117.17 is provided). FAA's Response To Clarifying Questions, Docket No. FAA-2009-1093, states that a nighttime operation is one that commences between 2200-0500. Based on this understanding, most of UPS's flights would not be nighttime operations, since they are in flight duty periods that commence before 2200. Assuming, however, that FAA intended to deem nighttime operation to mean a flight duty period with any operation between the hours of 2200-0500, the rule would affect the vast majority of UPS's flights.

net result is a duplicative and conflicting set of regulations covering the same duty day.

- Flight duty period (FDP) limits. The proposed new FDP limits in Section 117.15 are significantly lower than the limits permitted under current regulations.[19] Moreover, since the new limits are based on the time of day that a pilot reports to work—rather than his or her originally agreed schedule—a pilot's available FDP can fluctuate overnight and is unpredictable, putting UPS in an untenable position. Again, because flight time limits and flight duty period limits both vary with the crew's reporting time, the result is a needlessly complex and impractical set of rules that will require constant cross-referencing and can easily induce an unintended violation.

- Limits on duty periods. The new limits, contained in Section 117.23, encompass the vaguely defined category of "administrative duties." Such duties are completely at the discretion of the flightcrew member, saddling the air carrier with liability for mistakes while offering no way to track such "duties."[20] Moreover, the rule permits cumulative duty extensions only if crewmembers scheduled to "deadhead" do so in first class, yet another example of the FAA solving a labor management conflict and not a safety problem. This specious requirement cannot be relied upon for planning purposes. The agency never bothers to explain what to do if first class seats sell out or if none even exist for a given flight.

- Rest periods. As proposed, "rest" in Section 117.25 does not start until a crewmember arrives at the hotel or sleep facility, even though his or her arrival time is completely out of the certificate holder's control in the best of cases and is subject to crew manipulation in the worst of them. An airline dispatch department would seldom even know when the crew actually arrives in the hotel, and there is no automated method of tracking this information. In addition, the regulation assumes the crew will use the provided hotel, which is not always true. Many crewmembers bid trips to be in their home city during a layover, making this regulation unwieldy.

- Augmentation credit. Section 117.19 provides for longer flight duty periods in the case of augmented flight crews. Unfortunately, the rule appears to have been written based on the obviously incorrect assumption that every air carrier, including cargo operators, have passenger cabins.[21] Of course, all-cargo carriers

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[19] At times, they reduce the limits to nine hours from 16 hours, which is a 44% reduction in available flight duty. There is no empirical scientific evidence to support such a drastic reduction.

[20] Unfortunately, the certificate holder would also be completely helpless in preventing some manipulation of this "administrative duty" provision by a flightcrew member who wishes to adjust the duty period so as to make himself/herself illegal for the next subsequent duty period.

[21] This provides a clear example as to why it is bad policy to create one level of regulation for a diverse industry with varying business models.

generally do not; they have a flight deck and cargo containers. The regulations appear to take no account of the practicalities of running an all-cargo airline; for example, UPS occasionally needs to substitute a Boeing 767 for an MD-11 with bunks for maintenance or other reasons. It will lose the ability to do so, resulting in a flight cancellation. Moreover, the rules forbid operators from taking advantage of augmentation (and thus extending FDP limits) if the last leg does not permit in-flight rest. This makes no provision for flight diversions.

- Acclimation credits and penalties. Sections 117.15(b)(1) and 117.19(b)(1) set up a hopelessly complex system that governs the interplay between a crew's "acclimation," which occurs only at 36 hours of rest or when in a new theater for 72 hours, and the related flight duty period limits. As mentioned earlier, the proposed regulation predicates the length of the FDP on the crew's actual report time (not scheduled). By adding another variable—acclimation—the equation becomes unworkable for planning purposes. For example: A Louisville-based "unacclimated" crew is scheduled to report in Cologne, Germany (a UPS hub) at 18:45 local time after a 35 hour and 30 minute rest period. However, due to more favorable tailwinds the day before, the flight crew arrives 31 minutes early. As a result, the crew may no longer legally operate the scheduled return flight the next day because the crew has experienced "unplanned acclimation" by exceeding 36 hours of rest; they now fall into an FDP category tied to local time, not home base time, which produces an FDP limit less than what was planned. This produces a patently absurd result: the crew receives more rest, yet under the proposed rules, may only work fewer hours and must be reassigned to a different trip.

- "Split Duty" extension. Section 117.17 allows a flight duty period to be extended based on the pilot's *actual* rest time "behind the door" of a hotel room or other suitable accommodation. The inherent variability in this situation creates a "Catch-22" for any operator conducting a nighttime sort: when an extension is actually most needed because of a disruption in the schedule due to a weather event, for instance, it becomes unavailable unless the operator compounds the disruption by intentionally delaying flights leaving the sort facility.[22]

- Time spent on reserve. Under Section 117.21, time spent on short call reserve status will be considered to be a form of duty subject to the cumulative limitations on duty prescribed in the proposed FAR §117.23. Treating reserve as if it were flight duty makes no sense. Consider a crew whose members have been sitting at home for five days straight observing a 14-hour on-call period each day. On the sixth day, the company would like to schedule the crew for a two-day trip requiring only 10 hours of total duty with flying entirely during the daytime. That assignment would violate the proposed regulation. In addition, given the ever present possibility of voluntarily assumed "administrative duties," nothing

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[22] This defies common sense and logic and supports the claim that this regulatory scheme has not been adequately vetted and will result in unintended consequences that will actually add to pilot fatigue, rather than mitigate it.

> precludes a pilot from reporting such activities, so that he or she becomes unavailable for an additional reserve assignment—in this scenario, having done little more than sit at home waiting for the phone to ring.

3. THE "ONE SIZE FITS ALL" APPROACH TO FATIGUE MANAGEMENT IN THE PROPOSED REGULATION LACKS ANY RATIONAL BASIS.

Nineteen years ago the FAA recognized the appropriateness of having a set of regulations for cargo carriers on pilot flight and duty time that differed from that applicable to passenger airlines, explaining:

> In an overnight delivery cargo operation, the flight crewmember must adjust to a nocturnal lifestyle that requires a 12-hour displacement of the normal wake cycle. Once this adjustment is made, the flight crewmember must function like any other individual employed in a night shift environment. The FAA…recognizes that once this circadian rhythm adjustment is made it could be counter-restful to unnecessarily change to a day schedule and then have to readjust to the nocturnal schedule.

Exemption No. 5296 granted to DHL Airways, initially granted Apr. 10, 1991. The agency had it right in focusing on the "night shift environment." Since then, the FAA has developed a regulatory regime that duly reflects important differences between overnight express and daytime passenger business models.

The proposed regulation abandons this practice and, in an about face, adopts a "one size fits all" mandate "whereby the distinctions between domestic, flag, and supplemental operations are eliminated." 75 Fed. Reg. 55,854. The consequences that flow from this regulatory fiat are severe: among other things, the new rules' prohibition on crew members flying for more than three consecutive nights would, if applied to UPS, effectively gut the economics of the UPS domestic scheduled cargo express network. In short order, a practice that is regarded as entirely safe under the present regime (and in practice *is* entirely safe) is suddenly deemed to be unsafe under the new one. This is but one of many entirely unnecessary burdens that the proposed regulations imposes on the all-cargo air carrier industry.

The notion that a single, prescriptive regulation is necessary to achieve "one level of safety for all commercial flight operations" is specious. Different operating environments demand different safety protocols—and the refusal to acknowledge such differences in fact sacrifices "one level of safety" at the alter of regulatory simplicity. J. Randolph Babbitt, the current FAA Administrator, said it best when he remarked, *"In rulemaking, not only does one size not fit all, but it's unsafe to think that it can."*[23]

The Administrative Procedure Act does permit federal agencies to reverse course. But it also requires a reasoned explanation and at least a modicum of evidence to support such changes in settled rules. Putting aside that the FAA's accident analysis is wholly speculative, *see infra* at 35, and that the agency lacked adequate scientific information for this regulatory change, *see infra* 30, the agency has failed to articulate any plausible rationale for abandoning the existing regulatory regime in favor of the new "one size fits all" approach.

a. The FAA Never Explains Why It Equates Scheduled Cargo Express and Passenger Operations.

The FAA's overarching desire for an *identical* set of regulations governing all part 121 operations elevates form over substance and causes it to ignore scientific evidence that differing working conditions and operational environments actually demand different fatigue-mitigation strategies. Common sense, and years of operating history, clearly establishes that uniformity does not necessarily improve safety in such a complex and diverse industry.

The agency's approach here conflicts with a host of other FAA regulations that provide for individualized compliance programs to be developed by each carrier and approved by the FAA—ranging from AQP training and aircraft maintenance programs to drug testing programs.

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[23] J. Randolph Babbitt, Administrator, Fed. Aviation Admin., ALPA Air Safety Forum: We Can't Regulate Professionalism (Aug. 5, 2009), *available at* http://www.faa.gov/news/speeches/news_story.cfm?newsId=10680 (last visited Oct. 27, 2010).

See, e.g., 14 C.F.R. 121 subpart Y; 14 C.F.R. 120. The agency never explains why a similar approach could not be adopted with respect to flightcrew hours of service regulations. (*See* section VI, *infra*, for a more detailed description of proposed alternatives.) Oddly enough, the FAA acknowledges in the preamble to the current proposal that rigid uniformity is not necessary. While describing fatigue as a universal problem, the agency elects to take what it describes as "incremental" steps in addressing it.[24] Thus, the proposed regulation would apply only to operations under *Part 121* of the FARs, including scheduled passenger, scheduled cargo express, and non-scheduled cargo flying large aircraft. While regulating airlines who carry only cargo,[25] the agency exempts one of the fastest growing segments of the airline industry—on-demand airlines *carrying passengers*—from all the prescriptive requirements for the explicit reason that they may pose less overall risk to the flying public. 75 Fed. Reg. 55,857.

The proposed regulation makes no attempt at all to explain how an "incremental" approach supports applying rules designed for passenger airlines to cargo operators—it barely even addresses the issue. Instead, the preamble notes, without explanation or elaboration, that "fatigue factors…are universal." *Id.*. This overly simplistic answer does not justify overturning a decades-old-regime that was developed precisely because all air operations are *not* the same. Nor does it justify the FAA's failure to deal with the myriad differences between passenger and cargo airlines, discussed immediately below.

b. The Proposed Regulation Does Not Fairly Assess The Balance Of Costs And Benefits For The Scheduled Cargo Express Sector.

The proposed regulations pay no heed to real differences in types of commercial air services available in the U.S. and around the world or to the implications of those differences for

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[24] Flightcrew Member Duty and Rest Requirements, 75 Fed. Reg. 55,857 (Sept. 14, 2010).

[25] *Id.*

management of crew fatigue. The rulemaking does not attempt to deal with the unique operating characteristics of scheduled cargo express carriers. Rather, the proposed rules seemingly are based on the assumption that all air carriers operate multiple flight segments each day with the same aircraft. Nothing could be further from the truth.

As we explain below, the cargo express industry differs so dramatically from the airline passenger industry that drafting one set of regulations for both of them almost defines the term "capricious." As discussed on page 6, UPS pilots operate significantly fewer hours per month than do pilots working for passenger carrying airlines. Further, UPS's average daily aircraft utilization is also considerably less than a typical passenger airline's aircraft utilization. The entire domestic UPS operation is predicated on a trip involving the departure in the early evening from an originating city with the aircraft flying into a domestic sort facility, followed post-sort by an operation back to the originating city in the early morning.

Further, the composition of the typical UPS payload differs greatly from that of a passenger carrying airline. UPS does not carry paying passengers. The risk of human loss in a fatal accident is thus orders of magnitude lower than the risk inherent in a passenger carrying airline. By the same token, the FAA utterly fails to recognize the ramifications of its regulations to an express delivery business whose freighters cannot reach their destinations on time. The implications for the public at large of unreliable freight delivery are substantial. Payloads of perishable goods can become completely worthless. Lives can be at stake, as UPS routinely carries medical supplies and pharmaceuticals on its aircraft. Much of the modern U.S. economy depends on the "just in time" management of business inventory, and many of the highest value items travel by air freight. Service failures can thus have dramatic economic consequences.

i. The presumed benefits of the proposed regulations are significantly lower for all-cargo operators than passenger airlines.

UPS has gone to extraordinary lengths to protect its pilots and other employees, and its comments here do not suggest it should be held to a lesser safety standard than passenger airlines. To the contrary, UPS believes it has achieved the highest level of safety by adopting the many fatigue-mitigation measures described earlier. The FAA should have accounted for those measures in its current rulemaking proposal.

In assessing the costs and benefits of the proposed rules and in evaluating concrete alternatives, the agency is legally *required* to consider the differences between cargo and passenger accidents. The harm to the public inherent in a cargo carrier accident—and hence the benefits derived from averting that harm—is self-evidently less than that in a passenger carrier accident. As the FAA's cost-benefit analysis acknowledges, the harm from the former is primarily property damage; in the latter, it is the potential massive loss of life.

By way of comparison, a passenger-configured Airbus A300 operates with a crew of 2 pilots, as many as seven flight attendants, and potentially 315 passengers. The benefits of avoiding a passenger-configured A300 accident include saving 324 human lives. According to FAA's averted fatality numbers, this is valued at $4.08 billion. In contrast, a typical UPS Airbus A300 operates with a crew of two pilots and can carry a typical load of about 12,000 packages. The benefits of avoiding a cargo-configured A300 accident, therefore, includes two lives and as many as 12,000 packages. Thus, according to the FAA, the benefit of averting a UPS A300 accident is approximately $25.2 million.[26] As this demonstrates, it is fallacy to assume that the benefits of applying a single regulatory scheme to the all-cargo and passenger sectors of the airline industry are either qualitatively or quantitatively the same—or even that they are remotely comparable. The two industries are, quite simply, apples and oranges. Treating them as

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[26] Moreover, whereas the benefits of avoiding a passenger carrier accident adhere directly to the flying public, scheduled cargo express carrier customers reap no corresponding benefit because cargo carriers generally must reimburse their customers for the cost of lost and destroyed property.

identical will produce a cost-benefit tradeoff that cannot possibly be justified and, more importantly, may actually lessen safety in the cargo sector (as discussed, *infra*, at pp.__).

ii. The direct costs of the proposed regulations are significantly higher for scheduled cargo express carriers.

Cargo carriers suffer substantially greater costs as a result of any service failures caused by the inflexible nature of the proposed regulation. Passenger air carriers need not refund the cost of the ticket when a flight is delayed or cancelled. The airline rebooks the passenger on a different flight and, in limited circumstances, pays for hotel rooms and meals. UPS, however, offers Guaranteed Service Refunds, meaning that if the package is not delivered on-time, the customer's entire fee for package delivery is refunded. Offering refunds for as many as 12,000 packages in a UPS Airbus A300 represents a significant expense. And this does not account for the lost future revenue due to customer dissatisfaction with the service difficulties.

The fundamental differences between business models of the passenger and cargo express industry have long been understood by the Federal Government, including the Congress. Air cargo was deregulated separately from and prior to the passenger segment of the industry. In 1977, Congress amended the Federal Aviation Act of 1958 to, among other things, deregulate the transportation of air cargo.[27] Passenger airlines were deregulated one year later.[28] The initial impetus behind these changes appears to be a legislative proposal submitted by the Civil Aeronautics Board to Congress which included provisions to deregulate the all-cargo sector.[29] This proposal and other legislative activity spurred numerous hearings on the subject of

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[27] An Act to amend title XIII of the Federal Aviation Act of 1958 to expand the types of risks which the Secretary of Transportation may insure or reinsure, and for other purposes., Pub. L. No. 95-163, § 17, 91 Stat. 1284 (1977).

[28] Airline Deregulation Act, Pub. L. 95-504, 92 Stat. 1705 (1978).

[29] Letter from Chairman John E. Robson to Representative Glenn M. Anderson, Chairman- Subcommittee on Aviation, June 3, 1976. and Letter from Chairman John E. Robson to Senator Howard W. Cannon, Chairman Subcommittee on Aviation, June 3, 1976.

deregulation in general. In testimony before the House Subcommittee on Aviation, Deputy Secretary of Transportation John W. Barnum stated, "[a]lthough much of our initial efforts to reform aviation economic regulation focused upon passenger transportation, we have always realized that the present regulatory structure creates unnecessary problems for air cargo transportation and that reform is needed in this area."[30] Representative Glenn Anderson, sponsor of the legislation and conference committee member, said the following during the discussion of the Air Service Improvement Act of 1977, which UPS believes evolved into the final legislation:

> Under existing law service with all-cargo aircraft is regulated in essentially the same manner as is passenger service….The regulation of domestic all-cargo service has not produced good results for industry or for the shipping public. With few exceptions domestic all-cargo service has been unprofitable since 1967. Between 1965 and 1975 freighter operations accumulated $210 million in pre-tax losses. In the past few years all cargo service has been reduced substantially and cargo has been moved on combination aircraft. The schedules of combination aircraft are geared to the needs of passengers who generally want to travel during daylight hours. By contrast shippers of cargo frequently desire overnight service with late evening departures and early morning arrivals. The failure of regulated service to meet the needs of shippers has been demonstrated by the recent growth in unregulated operations.[31]

iii. The implications of service failures that will be caused by rigid work rules are drastically different for scheduled cargo express carriers.

Similarly, the indirect costs the proposed regulation would impose on passenger and cargo carriers are very different. If a passenger operation cancels, passengers may be rebooked

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[30] To Broaden the Power of the Civil Aeronautics Board to Grant Relief by Exemption in Certain Cases., Before the Subcomm. On Aviation of the H. Comm. On Public Works and Transportation, 94th Cong. 4-5. (1976) (statement of John W. Barnum, Deputy Secretary, United States Department of Transportation).

[31] 123 Cong. Rec. 30,599 (1977).

on later flights, or they may seek alternative transportation arrangements to reach their destination. The number of passengers affected, moreover, is usually quite limited. Thus, while the schedules and plans of these customers may be disrupted, the impact of the delay is similarly limited. In contrast, the risks to brand and reputation from service delays are far greater for cargo carriers like UPS. UPS customers use UPS as opposed to other methods of cargo shipment precisely because they need to ship goods overnight. The harms caused by delay, moreover, are particularly acute for UPS cargo that includes life-sustaining medications and medical equipment that absolutely must reach their destination with as minimal delay possible, as well as for perishable goods that will be destroyed if flights are canceled. The proposed regulation, however, similarly ignores the very different indirect costs imposed on these very different industries.

iv. The scheduled air cargo express model differs greatly from the passenger airline model.

Given their different business purposes, it is not at all surprising that passenger and cargo airlines utilize dramatically different business models. The proposed regulation glosses over these differences and accommodates only one business model: domestic passenger airlines.

Domestically, passenger airlines typically serve the same city-pairs several times a day through “connecting complexes” at airport hubs. Aircraft are scheduled for service from early morning until late at night. To accommodate this passenger demand, these carriers also “depeak” their schedules to minimize in-transit ground times when flight connections are required (many city-pairs lack nonstop service). These depeaked schedules spread out resource utilization, avoid triggering major delays, and improve the passenger experience by creating more options. If a passenger is late, he or she can be rebooked on later flights on the same or, through interline arrangements, a different airline.

Cargo transport is entirely different. In the UPS network the vast majority of cities have only one operation per day. Flights depart on a staggered basis so as to begin arriving at the sort hub around 11:00 p.m. and return in time to meet the morning delivery deadlines also on staggered basis. Crews never operate more than four segments in a flight duty period, and about half of the flight duty periods contain just two segments. The duration of each segment is generally less than 2 hours. Moreover, the shipments *must* make it to the sort facility on-time if they are to reach their scheduled delivery points on-time and UPS is to make good on its guaranteed service commitments. Packages cannot be "rebooked" on another flight. Cargo carriers cannot depeak their schedules. To the contrary, consolidated cargo carriers such as UPS depend upon gathering all "inbound" cargo before loading "outbound" flights. If a UPS flight fails to operate into or out of the sort facility, an entire city can potentially miss on-time delivery that day.

International operations are also significantly different for cargo airlines. The typical passenger-airline international operation consists of one segment from the U.S. to the foreign city, a crew layover period, and a one segment return flight. Schedule disruptions are easily manageable due to the confined nature of the operation. UPS's international operations typically involve much more point-to-point flying beyond U.S. borders, often times in very remote locations. Due to the vastness of the operation, and the fact that UPS crews and aircraft do not continually traverse "hub" cities, it is nearly impossible to recover from service failures due to crews "timing out." Just one service failure ripples throughout UPS's entire network and all of the cities that aircraft is scheduled to serve. Again, UPS does not enjoy the option of simply rebooking packages on another carrier's aircraft.

The proposed regulation accounts for none of these differences, and instead demands that cargo carriers operate in conformance with rules designed for domestic passenger carriers.

v. Diverse operational models demand different fatigue mitigation strategies.

As the FAA has previously recognized, these different business models call for different fatigue mitigation strategies. Passenger airline crew utilization tends to focus more on multiple segments within a flight duty period with little “sit” time between flights. Limiting flight duty period duration to mitigate fatigue is appropriate for this type of operation. And as passenger airlines tend to conduct very few night operations in the US domestic market, passenger airline rules must address the fatigue that results from intermittent nighttime operations.

UPS’s operations, however, are very different. UPS crew utilization tends to focus on fewer segments with long breaks between segments for a given flight duty period. Thus, UPS flightcrew members spend less “time on task” than their peers flying for passenger airlines. They have many fewer landings and takeoffs, the points in flight during which accidents caused by pilot error usually would occur. Additionally, the long breaks between segments allow our flightcrew members to obtain restorative rest between segments, and our crews generally have longer rest periods between flight duty periods. Likewise, unlike with passenger carriers, the majority of UPS’s domestic operation occurs at night. Thus, UPS flightcrew members adjust their lifestyles in the same way as other professionals working “night shifts.” As the FAA has explained, “once this circadian rhythm adjustment is made it could be counter-restful to unnecessarily change to a day schedule.” Exemption No. 5296 granted to DHL Airways, initially granted Apr. 10, 1991.

Given these differences, cargo pilot fatigue is best mitigated by allowing scheduled events to be *completed* for a given flight duty period and then adding more rest should the flight duty period be unexpectedly extended. Draconian limits on nighttime flying—including the ban on extending a crew's FDP (even when well below maximum limits), the mandated four-hour rest periods between flight segments (for split duty credit) and the ban on more than three consecutive nighttime operations—impose enormous and disproportionate costs on carriers, like UPS, who primarily operate at night. Yet, in proposing to abandon the existing regulatory scheme and any concept of flexibility, the FAA never acknowledges that its rules may potentially gut the cargo express business model.

c. The FAA Recently Abandoned A Similar "One Size Fits All" Approach Given Its Inability To Resolve Numerous Complex Issues.

The FAA's proposed "one size fits all" approach, moreover, is irreconcilable with its recent decision to abandon a similar regulatory regime for flight and duty time rules—after studying it for fifteen years—because it raised numerous complex questions that the FAA was unable to resolve. *See* 60 Fed. Reg. 65,951-65,977. Given that the FAA was unable to resolve such issues after fifteen years of study, it is simply inconceivable that the FAA would promulgate an even more complex regulatory regime and demand that it be fully analyzed in just a few short months.

In 1995, the FAA promulgated a rule that, like the present proposal, would have adopted a "one size fits all" approach to pilot flight, duty, and rest regulations. Like the present proposal, the 1995 rule would have eliminated the distinctions between domestic, flag, and supplemental operations. *See, e.g., id.* at 65,951 (noting that one "purpose of this proposed rulemaking is to establish consistent and clear duty period limitations, flight time limitations, and rest requirements for all types of operations"); *id.* (asserting that "with advancements in new aircraft, these operational distinctions [between flag and supplemental] are no longer as meaningful as they once were").

As with the current proposal, the 1995 proposal was met with strong and uniform opposition by the airline industry. The ATA, for example, objected that "[t]he FAA's desire for a single, all-encompassing rule exalts form over substance and has caused it to ignore scientific findings that differing working conditions and environments require different strategies." *See* Comments of the Air Transport Association, FAA Docket No. 28081 at 72. In support of its position, the ATA highlighted the fact that the current rules reflect the operational differences of various types of operations. For example, the ATA noted that FAA had previously acknowledged and accepted, via its exemption authority, that individual operations can require distinct work rules—and in particular, that the FAA had previously exempted DHL—an airline cargo company—from the requirement that it comply with certain regulations governing nighttime flights, precisely because "[i]n an overnight delivery cargo operation, the flight crewmember must adjust to a nocturnal lifestyle that requires a 12-hour displacement of the normal sleep-wake cycle" and, in the context of such a work environment, "it could be counter-restful to unnecessarily change to a day schedule and then have to readjust to the nocturnal schedule." *Id*. at 101-02.

ATA also cited a study by Dr. Timothy Monk noting that the proposed rule did not account for the scientific evidence regarding "inter-task" differences encompassing international long-haul, domestic short-haul, and commuter airline operations. *Id.* at 72, citing Monk, Dr. Timothy H., Position Paper: "How Well Do The Proposed FAA Regulations Incorporate Scientific Findings Regarding Circadian Rhythms and Fatigue?" June 17, 1996 at 4-5. Dr. Monk concluded that there is no scientific basis for assuming that 10 hours of short-haul or commuter duty is the same as 10 hours of cruising across the Pacific with regard to fatigue regulations. In addition, the ATA pointed out that two NASA studies (NASA Crew Factors II (Short-Haul

Study) and NASA Crew Factors VIII (Long-Haul Study)) contained findings suggesting it is appropriate to have different kinds of rules for different kinds of schedules.

Nor was the ATA alone in its criticism of the 1995 proposal. To the contrary, just a small sampling of the comments reveals the depth of the problems with the FAA's 1995 proposal:

Kitty Hawk AirCargo, Inc., pointed out that the FAA has in the past correctly recognized the needs of whole segments of the industry, such as scheduled all-cargo operations, and that the proposed regulations would not enhance safety but, instead, would limit the flexibility that Kitty Hawk currently offered its customers in responding to their on-demand cargo charter requirements. *See* Comments of Kitty Hawk Air Cargo, Inc., FAA Docket 28081, filed June 19, 1996.

NACA agreed that the "one size fits all" formula completely ignored the diverse operational environment that included scheduled and non-scheduled domestic operations with their short, multiple mission segments into high density airports; international scheduled and non-scheduled operations that provided much longer, less stressful mission segments and where crewmembers had ample opportunity to practice fatigue countermeasures; fundamental differences between cargo and passenger operations; additional fundamental differences in scheduled and non-scheduled operations; and, within all of these, the subtle differences in crewmember scheduling to meet the worldwide customer demand for competitive air transportation. *See* Comments of the Nat'l Air Carrier Assoc. On Flight Crewmember Duty Period Limitations, Flight Time Limitations, and Rest Requirements, FAA Docket No. 28081, filed on June 19, 1996.

Northwest Airlines observed that common sense and years of operating experience demonstrated that simplicity did not necessarily mean safety in this complex and diverse industry, pointing out that many other FAA regulations provided for more individualized compliance programs, and that there was no reason why a similar approach could not be adopted here—either on a carrier-by-carrier basis or on the basis of industry segments with different operating characteristics. *See* Comments of Northwest Airlines, Inc., FAA Docket 28081, filed June 19, 1996.

In response to these comments, on November 23, 2009, the FAA withdrew the 1995 regulation. In so doing, it explained that after examining the issue for some 15 years, it was simply too much work to resolve the myriad issues and objections that had been raised by the various stakeholders. Labeling the 1995 proposal as "outdated," the agency complained that "it raised many significant issues that the agency needed to consider before proceeding with a final rule."[32]

Notwithstanding the fact that the FAA could not resolve these issues after 15 years of study, it now proposes a similar "one size fits all" rule that raises virtually identical issues to the recently-abandoned 1995 rule. The FAA, however, does not even attempt to explain how between November 23, 2009—when it abandoned the 1995 rule—and September 14, 2010—when it proposed the present rule—the FAA managed to resolve the intractable issues that caused it to abandon the 1995 rule in the first place. And the reason it offers no explanation is because there is none. The FAA simply cannot resolve—and has not even tried to—the insoluble problems presented by trying to craft a single, uniform rule for a diverse industry where, most assuredly, one size does not fit all. Its inability to do so—or even to offer the most rudimentary justification for promulgating the present rule without even trying to reconcile it

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[32] Flight Crewmember Duty Period Limitations, Flight Time Limitations and Rest Requirements; Withdrawal, 74 Fed. Reg. 61,067, 61,068 (Nov. 23, 2009).

with its abandonment of the prior one—further demonstrates the arbitrary and irrational nature of the current endeavor.

4. THE FAA’S COST-BENEFIT ANALYSIS HAS SO MANY FUNDAMENTAL ERRORS IT CANNOT LOGICALLY JUSTIFY THE REGULATIONS.

As a threshold matter, the FAA’s cost-benefit analysis demonstrates that the cost of this proposal would significantly exceed the benefits by almost $600 million. *See* Regulatory Impact Analysis, Flightcrew Member Duty and Rest Requirements Part 117 Notice of Proposed Rulemaking at 1 (“RIA”). However, even this enormous negative net result dramatically understates the mismatch between costs and benefits, at least in part because of the FAA’s failure to take into account the differences between cargo and passenger airlines. UPS agrees with and joins the criticisms of the FAA’s cost-benefit analysis by the CAA and ATA and their respective experts. In addition, as further explained by Dr. Donald B. Rubin, the former Chair of Harvard University’s Statistics Department, the FAA’s analysis is wildly inaccurate because it uses statistics incorrectly and produces an “effectiveness” rate and resulting benefits calculation for the proposed regulation that are completely unreliable. *See* Ex. [XX] (Expert Analysis of Dr. Rubin).

a. FAA’s Analysis Of Airline Accidents Is Highly Flawed.

The lynchpin of the FAA’s cost-benefit analysis is its assessment of past airline accidents. Any mistake in that assessment thus infects the entire rule because the FAA uses these accidents as the basis for its determination of the supposed benefits of its proposed regulations. The FAA’s treatment of past accidents, however, is hopelessly flawed. UPS agrees with and adopts the analysis of the ATA and CAA and their experts, which explain many of these defects. A more fundamental deficiency is explained in detail in the attached expert report prepared by Dr. Donald B. Rubin of Harvard University, who is recognized as the leading authority in the field of causal inference in statistical analysis. Dr. Rubin has been a consultant to several federal agencies (including the Food and Drug Administration, the Centers for Disease Control, and the National Highway Traffic Safety Administration) on the very sort of statistical problems at issue here. In his declaration, Dr. Rubin reviews the role of statistical analysis for complex public policy problems of a scientific nature, the use of causal inference analysis, and the steps FAA should have taken to develop a valid statistical argument to ascertain the extent of and remedy any problem related to fatigue.

As Dr. Rubin explains, the FAA's methods of observation and analysis are unsound and thus the conclusions drawn are scientifically invalid. The agency cites and relies upon 22 accident reports as justification for this proposal.[33] In the time frame examined, these flights represented 0.0000066% of all air carrier flight operations.[34] The FAA has provided no data or information on the remaining flight operations which were operated safely. The minuscule sample size would alone be sufficient to render the analysis defective, but that is hardly the only or even the major flaw.The FAA provides no basis to explain the *absence* of fatigue-related accidents or incidents on the overwhelming majority of flights. Without such a "control group," the proposed measures have no frame of reference to demonstrate efficacy. Thus the FAA's observations suffer from a massive bias because they exclude data from the millions of flights that '"went right,"' as well as from flights that '"almost went wrong"' (based on self-reported pilot errors). Without an actual understanding of the operation of these normal flights, the FAA cannot draw valid conclusions about what goes wrong in other cases.

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[33] The FAA reviewed 250 accidents where pilot error was a factor. This list was narrowed to 43 accidents where pilot schedule history was available. Using the available data, the FAA concludes that pilot fatigue was a factor in 22 accidents.

[34] FAA Aerospace Forecast

As Dr. Rubin explains, in medicine and similar fields where human factors play a large role in explaining rare events, scientists must study both healthy and ill patients to understand disease and well-being. They cannot study only the ill and make valid observations about human physiology. To do so is to engage in random speculation. As the report states, "the FAA analysis only examined accidents that occurred. It made absolutely no effort to characterize the difference between those flight segments and the millions of flight segments without accidents or incidents, nor between the latter ones and the thousands of flight segments with self-reported pilot errors. In my view, the analysis was thus entirely unable to address the question presented about the consequences of implementing the proposed regulation, even in the past."[35]

Indeed, the FAA should be well aware of the folly of this type of analysis, having worked to avoid them in other flight safety initiatives. Perhaps the most notable manifestation is the Line Operations Safety Audit ("LOSA") program which was developed with FAA funding in conjunction with the University of Texas. According to the FAA-funded study, "[a]n understanding of flight safety can *only* be gained from valid, empirical data about *normal operations.* There are several sources of such data, each incomplete. However, in combination they can provide a good understanding of the strengths and weaknesses of operations"[36] (emphasis added). The other sources cited include: accident investigations, incident reports, line checks, flight data recorder monitoring, and normal flight monitoring. *Id.* In relying solely on

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[35] Dr. Rubin further explains that analysis based only on failure events can only be valid in certain situations in which there is a thorough understanding of cause and effect. For example, FAA Airworthiness Directive 2010-23-16 is based on the knowledge that certain Flow Control Shutoff Valves on the Embraer 500 may fail and cause de-pressurization and mandates replacement of those parts with new and improved parts.

[36] Helmreich, R.L., Klinect, J.R., & Wilhelm, J.A. (in press). *System safety and threat and error management: The line operations safety audit (LOSA).* In Proceedings of the Eleventh International Symposium on Aviation Psychology. Columbus, OH: The Ohio State University. (UTHFRP Pub 261) at 1, available at http://www.faa.gov/library/online_libraries/aerospace_medicine/sd/media/Helmreic.pdf

accident investigations and ignoring LOSA (among other data sources) in formulating its proposal, the FAA has ignored its own advice.

The FAA actively promotes the adoption of LOSA by operators. For example, in Advisory Circular 120-90, the FAA praises the unique merits of LOSA relative to other programs:

> LOSA is distinct from—but complementary to—other proactive safety programs such as electronic data acquisition systems (e.g., FOQA), and voluntary reporting systems (e.g., ASAP). However, these programs have two major conceptual differences.
>
> (1) First, FOQA and ASAP rely on outcomes to generate data. For FOQA, it is flight parameter exceedances; for ASAP, it is adverse events that crews report. By contrast, LOSA samples all activities in normal operations. In these regularly scheduled flights, there may be some reportable events, but there will also be some near-events and, importantly, a majority of well-managed, successful flights. LOSA provides a unique opportunity to study the flight management process, both successful and unsuccessful, by noting the problems crews encounter on the line and how they manage them.
>
> (2) The second major difference is the perspective taken by each program. With its focus on electronic data acquisition downloaded directly from the aircraft, FOQA can be said to have the “airplane perspective.” ASAP provides the “pilot perspective” by using pilots’ voluntary disclosure and self-reporting of events. ASAP reports provide insight into why events occur as seen from the crew’s perspective. By contrast, LOSA provides a “neutral, third-party perspective” in that LOSA observers record contextual and flightcrew data on every phase of flight, regardless of the outcome. All three perspectives provide useful data to an airline’s safety management system.

The FAA is not the only safety body that has recognized the value of LOSA and its lesson that assessment and characterization of risk cannot rely on accident data and investigation alone. ICAO is also a proponent of LOSA. ICAO Document 9803 states: “It is suggested that understanding the human contribution to successes and failures in aviation can be better achieved by monitoring normal operations, rather than accidents and incidents. The Line Operations Safety Audit (LOSA) is the vehicle endorsed by ICAO to monitor normal operations.” With respect to accident investigation ICAO states:

This is not to say that there is no clear role for accident investigation within the safety process. Accident investigation remains the vehicle to uncover unanticipated failures in technology or bizarre events, rare as they may be. Accident investigation also provides a framework: if only normal operations were monitored, defining unsafe behaviours would be a task without a frame of reference. Therefore, properly focused accident investigation can reveal how specific behaviours can combine with specific circumstances to generate unstable and likely catastrophic scenarios. This requires a contemporary approach to the investigation: should accident investigation be restricted to the retrospective analyses discussed earlier, its contribution in terms of human error would be to increase existing industry databases, but its usefulness in regard to safety would be dubious….The approach proposed in this manual to identify the successful human performance mechanisms that contribute to aviation safety and, therefore, to the design of countermeasures against human error focuses on the monitoring of normal line operations. *Id.* at 1-2 and 1-4.

LOSA is one example of a data source that the FAA should have examined. The FAA also has data from the Aviation Safety Information Analysis and Sharing (ASIAS) System. ASIAS is an analytical system fed by a constellation of 46 data sources including FOQA, ASRS, ASAP and ATRS. There are plans to expand the input sources to 64 databases. ASIAS is currently ingesting FOQA and ASAP data (defined below) from 30 airlines representing 80 percent of commercial operations in the U.S. Yet there is no indication that the FAA considered any of them. The FAA has compiled a considerable amount of data within ASIAS and the University of Texas also has data which the agency could have analyzed with the proper methodology:[37]

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[37] *Fact Sheet – Aviation Safety Information Analysis and Sharing (ASIAS) System* (June 15, 2010), available at http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=11497

Data Source	Number of Observations/Reports
ASAP reports	71,000
FOQA reports	7,200,000
ATSAP reports	12,000
LOSA reports	6,977[38]

The FAA also could have used its authority to view air carrier records to ascertain the true state of affairs. By law, the airlines affected by this proposal are required to maintain records. Section 121.683(a)(1) states: “[An airline must] maintain current records of each crewmember and each aircraft dispatcher (domestic and flag operations only) that show whether the crewmember or aircraft dispatcher complies with the applicable sections of this chapter, including, but not limited to, proficiency and route checks, airplane and route qualifications, training, any required physical examinations, *flight, duty, and rest time records*.” (emphasis supplied). Airlines use specialized software and routinely generate reports upon FAA request to demonstrate compliance. The FAA apparently only sought and received records from a small number of carriers for the narrow purpose of their economic analysis. It does not appear they considered these ordinary business records in their assessment of the risks they now seek to address through this proposal.

There is no indication the FAA complied with its own methods of risk assessment and data characterization. For instance, Order 8040.4 requires that safety risk assessments, among other things, must “include all relevant data available.” That clearly did not occur in the formulation of this proposal as evinced by the wholesale omission of the vast majority of available FAA data sources. The Order also requires that assessments be “scientifically

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[38] Klinecht, J. Line Operations Safety Audit (LOSA): A Practical Overview. (2008), available at http://www.icao.int/nacc/meetings/2008/ASPA/Docs/ASPA_LOSA_Klinect.pdf

objective" and "be reasonably detailed and accurate." The FAA also clearly failed to meet those criteria in formulating this proposal. Vast swaths of this proposal have no scientific or other basis as a justification. The FAA's Aviation Safety Data Accessibility Study states the following about data analysis of carrier safety:

> Making reasonable comparisons between carriers with this data also requires some form of normalization, such as a "percentage of satisfactory inspections" format. Because such data occurs on a carrier specific basis, surveillance and inspection data should be examined to see if there are no persistent statistical differences among individual carriers as normalized accident and incident data are. With these new data in mind, it might be useful to distinguish between "safety performance," which would include negative outcomes (like accidents and incidents) and positive outcomes (like safe uneventful flights), and "safety effort," which would include the sorts of items examined in a surveillance or inspection report. The logic of this distinction is that "safety effort" by carriers seeks to ensure that most or all "safety performance" outcomes are positive. As is discussed below, it is well established that carriers cannot be distinguished by "safety performance," but additional research is needed to determine whether this is also true for "safety effort," and whether differences in "safety effort" are informative about "safety performance."[39]

There are still more flaws in the FAA's reasoning. The accident reports cited by the FAA do not actually establish a causal link between <u>the accident</u> and fatigue. Rather the reports only indicate the crews might have been fatigued and, importantly, the reports also include multiple other intervening factors that were equally or even more likely to have been the direct cause of the accident. Despite the absence of actual evidence indicating a) debilitating fatigue; and b) a

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[39] http://www.asias.faa.gov/aviation_studies/safety_data/safetydata.html

causal link between the assumed fatigue and the accident, the FAA presumes both to be true. Rather than using all of the data available and following its own established procedures for conducting analytical process, the FAA has resorted to contrived speculation on the basis of a minuscule body of skewed data.

Because the FAA's cost-benefit analysis is predicated almost entirely on its profoundly flawed analysis of past airline accidents and omission of the vast majority of relevant data, the integrity of the whole regulation is called into serious question. This alone requires the FAA to withdraw the proposed regulation.

b. The FAA's Analysis Of The Benefits Of The Proposed Regulations Relies On Flawed Methodology And Unsupported Assumptions.

Other significant errors and omissions in the FAA's analysis include:

First, in attempting to measure the effect of hours of duty on the likelihood of accidents, the FAA fails to account for obvious factors that undermine the FAA's assumptions about causation. The FAA's analysis of duty time limits is based solely on a comparison of accidents with the hour of duty in which the accident occurred. However, the FAA ignores the fact that landings—the time when an accident is by far the most likely to occur for intervening reasons entirely unrelated to fatigue—happen at the end of a duty period. According to the FAA Aviation Safety Data Accessibility Study:

Although a commercial aircraft spends only about six percent of its flight time in the takeoff, initial climb, final approach, and landing components of its flight, around 70 percent of "hull loss" accidents have occurred during these stages. (Weener and Wheeler, 1992) Because of this, using an hours flown-based measure or a mileage-based measure of risk can be misleading. This is especially true when comparisons are being made between segments of the industry that have different average flight lengths. Using a mileage-based measure will make a commuter type carrier with very short average flight lengths look more risk prone relative to a major jet carrier flying longer stage lengths on average. (This occurs because a carrier with shorter average flights will make more takeoffs and landings per mile flown, and a carrier is most exposed to the risk of an accident or incident during takeoff and landing). Prior research has shown the importance of comparing like groups of carriers (termed "peer groups") when comparing safety performance. (GRA 1988)[40]

Second, similarly, the FAA's analysis of the supposed harm based on fatigue from overnight flights also ignores several factors that could account for the correlation that the FAA attributes to fatigue. Many unaccounted-for factors, other than fatigue, could lead to increased accidents late at night. For example, the simple fact of flying in darkness, or the different kinds of aircrafts, pilots, and flight plans at night could account for some or all of the greater incidence of accidents. Likewise, the FAA fails to distinguish between nighttime flights by pilots not accustomed to such duties, and those by pilots who are and who repeatedly work the "night shift." This omission is particularly glaring because UPS—one of the largest overnight all-cargo air carriers in the world—has flightcrew members who routinely work the "night shift," and UPS has never had an incident or accident where pilot fatigue was even cited as a factor in an NTSB report. The FAA also overlooks alternate explanations of the accidents, even in the several examples where the primary accident investigator (the NTSB) concluded that fatigue was not a contributing factor.

Third, in determining the supposed effect of fatigue from overnight flights, the FAA looks at the time period from midnight to 4 a.m., even though the fatigue research that the FAA relies upon in its NPRM focuses on the 2-6 a.m. period. *See* RIA at 35; 75 Fed. Reg. 55855.

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[40] *Id.*

There is no explanation for this discrepancy. However, this has a significant effect on the estimation of the accidents due to overnight flights, since there are several more accidents that the FAA attributes to fatigue in the midnight to 2 a.m. period than there are in the 4 a.m. to 6 a.m. period.

c. FAA's Calculation Of The True Cost Of The Proposed Regulations Is Clearly Erroneous.

The accident analysis, however, is by no means the only problem with the FAA's cost-benefit analysis. That analysis accounts for only a very small fraction of the true costs associated with the implementation of this regulation. Even within the elements that the FAA included in its cost analysis, many components of those costs were significantly understated, and other costs were totally omitted.

i. The regulatory impact analysis omits many significant categories of direct costs that the proposed regulation would impose on UPS and other cargo carriers.

The FAA's cost analysis leaves out or underestimates many of the largest costs that the proposed regulation would impose on the cargo industry. Given the insufficient time provided by the FAA to prepare these comments—and the FAA rejected many requests for a short extension of that time period—UPS is unable to precisely quantify these costs. As described below, however, we can estimate them and they are substantial. These cost items are broken down into two categories: Direct Operational Costs and Indirect Business Losses.

1. Direct operational costs

Direct operational costs are the costs associated with expenditures that can be directly attributed to the proposed rule. Amongst the many direct operational costs ignored or underestimated by the FAA are the following:

First, the FAA estimates for additional flight crewmember costs grossly understate the true cost of compensation and the impact on staffing. To begin with, the FAA ignores the costs of adding new flight crewmembers to the payroll. The FAA estimates should have included the cost to recruit and hire new employees, as well as the cost to cover training and lost work time of other crewmembers who by operation of labor agreements will be moved up the ranks into other equipment and/or upgraded in status from co-pilot to captain. Other overlooked costs include the increased pay for flight crewmembers upgrading to higher categories of pay, the expense of greater simulator utilization, and increased cost of check airmen "override pay" to train the flightcrew members whose jobs change due to the influx of new hires.

The proposed regulations failed to account for the substantial costs of increasing pilot reserve staffing to deal with unintended trip drops as crewmembers "time out." Large increases in the necessary reserve pool will be required due to the inability to reschedule crews, three-consecutive night limit, and the mandatory 14-hour requirement before a reserve pilot may be given another assignment.[41] The increased weekly time off—from 24 hours off in every seven days to either 30 hours or 36 hours off (depending on the theater of operation)—will drive additional staffing. There is also significant expense transporting "deadheading" crews utilizing commercial travel on passenger carriers and paying for hotels and per diem amounts.

Second, the proposed rule on schedule reliability, Section 117.9, has not been accurately accounted for by the FAA. In the FAA's analysis, the only cost estimates are administrative costs to develop reports. Those are a small fraction of the overall costs to companies like UPS. Costs associated with increasing the company's overall block hours to meet the stringent scheduling requirement are extremely high and effectively punitive in nature. The FAA has

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[41] The 14-hour mandatory rest rule for a reserve has no basis in science, and is simply another example of rulemaking driven by collective bargaining influences versus regulating from the use of science.

failed to consider that, as with most collective bargaining agreements, pilot pay at UPS is based on the greater of scheduled or actual flight times. The schedule reliability provision of this new regulation will force UPS to pad its schedules—increasing block time for exactly the same trips. This will add significant costs to the airline's payroll with absolutely no increase in flying or fatigue mitigation and no public benefit. UPS conservatively estimates the cost of this requirement alone to be approximately $440 million each year.

Third, the FAA's estimate of training costs significantly understates their true cost. Missing from these calculations is the cost of trips that must be dropped to accommodate this training, and the associated travel costs including airline tickets, hotel rooms, and meals for employees who are spread across five continents. These costs are quite high because under the proposed regulation the employee population requiring this training includes more than just flightcrew members.

Fourth, the FAA failed to account for costs of aircraft modification that will result from this rule. The costs of aircraft modifications to comply with the proposed definitions of "rest facility" (Section 117.3) are enormous. UPS's existing fleet of Boeing 767-300ER aircraft do not have a rest facility that meets any proposed definition. *See* section IV.C.1.b.2, *infra*. Omitted costs here include the cost to build out and install the facilities, the costs to obtain FAA STC approval and the loss of revenue that the company will experience by having the airplanes out of service during the modification. In addition, there is the loss in payload capability (to offset the weight of the rest facility). None of these costs were considered by the FAA. UPS conservatively estimates this cost to be $18.4 million annually.

All told, UPS's direct operational costs of compliance will range between $ 1,344,528,240 on the low end and $1,807,419,110 on the high end. These costs and others, which are explained in the Declaration of David Parrott, attached as Exhibit 3, are summarized in the following chart:

REGULATION	**Est. 10 Yr. Compliance Cost – Low**	**Est. 10 Yr Compliance Cost – High**
Schedule Reliability Costs (117.9)	**$435,425,310**	**$535,687,717**
Fatigue Training (117.11)	**$17,107,560**	**$17,107,560**
Flight Duty Period Limitations and FDP Extensions (117.15 and 117.19)	**$401,049,628**	**$552,875,559**
Reserve Status (117.21)	**$151,825,931**	**$295,057,941**
Cumulative Duty (117.23)	**$20,911,873**	**$25,781,762**
Rest Periods (117.25)	**$42,969,603**	**$80,209,926**
Consecutive nighttime operations (117.27)	**$63,022,084**	**$74,480,645**
Implementation Crewmember Carrying Cost	**$22,466,250**	**$33,468,000**
Information Technology Infrastructure	**$5,000,000**	**$8,000,000**
Lost Revenue From and Installation Costs for Class 1 Rest Facility (117.3)	**$184,750,000**	**$184,750,000**
TOTAL	**$1,344,528,240**	**$1,807,419,110**
NET PRESENT VALUE TOTAL	**$960,840,962**	**$1,290,123,595**

In the limited time provided[42] UPS made its best effort to provide the FAA with a realistic quantitative analysis of the costs of this proposed rule.

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[42] UPS will supplement the record as additional data becomes available.

2. **Indirect business losses.**

The indirect business losses resulting from the rule—should UPS have to alter its operations, products and services to avoid the high costs of compliance—are also quite substantial. These, too, have been ignored because of the FAA's refusal thus far to account for the all-cargo business model. Some of these potential impacts on UPS are described below. All of them stem from a series of "Hobson's choices" the FAA proposal presents: either risk a huge loss of business or absorb costs of compliance that are unacceptably high.

3. **Lost goodwill**

UPS's entire reputation for reliable service is at stake. If UPS cannot afford to comply with the rule (by hiring hundreds of new flightcrew members, assuming they can be found), UPS will experience a much higher frequency of flight delays and cancellations. This will result in missed delivery times, which, in turn, will also hurt many businesses of all sizes in the U.S.[43] who depend on UPS's service reliability. There is little doubt that these businesses will ultimately find substitutes for their shipping needs.

UPS is a global carrier that competes against companies who will not be subject to these highly restrictive and inflexible regulations. A less reliable operation means that it will become impossible to match the dependability of foreign carriers who compete for the same business. The loss of a single customer in the air express business will frequently lead to a loss of that customer in other areas of UPS's business, such as a pharmaceutical company that also uses UPS to send promotional material to various doctors' offices and medical facilities.

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[43] UPS estimates that our integrated door-to-door delivery system carries goods having a value in excess of 6% of the U.S. GDP, or 2% of the world's GDP. (These figures represent UPS-carried shipments as a whole, not just the airline division.)

4. **Diminished value and utility of B767-300ERF fleet**

If adopted, this proposal would severely impact UPS's ability to continue operating the Boeing 767-300ER Freighter as we have since 1996. The B767 represents 18% of our existing fleet and UPS has 20 more on order with Boeing. UPS faces an untenable choice. The rule would require either the elimination of at least one main deck pallet position to accommodate a rest facility or limiting the length of B767 flights to segments that do not exceed Table A limits. As UPS operates 39 B767 aircraft (with 20 more on order), it would result in added expenses and lost revenues of approximately $18.4 million annually.

As to the latter, UPS would have to reduce flight times with these aircraft from the 13 hour stages we may currently operate to no more than the limits contained in Table A (8-10 hours depending on the time of day).[44] This reduction in range essentially removes the aircraft from many international markets, where it currently serves as a linchpin in the network. As a result, UPS would have to consider at least the following:

- Reconfiguring our global network to add or close facilities in cities around the world so that B767 services may continue to operate. (This could cost hundred of millions of dollars. The FAA has permitted insufficient time for UPS to more precisely estimate this cost.)

- Disposing of all or some part of our B767 fleet and ordering another aircraft type that could operate in our existing network. The costs could range into the billions of dollars. In addition to the costs of purchase or lease of a new fleet of 59 aircraft, UPS would have to purchase simulators, retrain pilots and mechanics, build new stores of spare parts, and amend numerous FAA-approved programs and processes to support a new fleet type.

- Cancelling or converting our remaining 20 orders for Boeing 767 airplanes. In addition to contractual penalties, the time between order and delivery of an aircraft can take years and there are costs associated with such a transition.

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[44] The UPS-IPA Collective Bargaining Agreement requires augmentation for flight times exceeding 8 hours. This contractual provision is not affected by changes in FARs.

In addition to greatly diminished utility in the operating environment, this rule would affect the asset value of the B767 fleet. The value of the B767 in the aftermarket would be reduced because of the lost payload capacity and a diminished range well below design specification.[45]

The FAA should have reasonably anticipated such effects and considered them in its analysis. The FAA's Transport Airplane Directorate approved the type design, airplane flight manuals, performance specifications, and operating configurations of every variant of the Boeing 767. *See* Type Certificate Data Sheet A1NM. The FAA's approved performance data, including payload/range capabilities, are among the key decision criteria used by buyers of these aircraft. Indeed, the DOT years ago recognized the unique role played by the B767 in evolving international markets when it articulated its International Air Transportation policy. It wrote, "[t]he introduction of technologically advanced aircraft such as the B-767, the MD-11 and the B-777 make direct service on longer or thinner routes economically viable. Moreover, airlines can viably serve heavily traveled routes with point-to-point service." *Statement of United States International Air Transportation Policy*, 60 Fed. Reg. 21,841, 21,843 (May 3, 1995) (hereinafter, "Statement").

In addition to having an intimate knowledge of the airplane's performance capabilities, the FAA also knows exactly how each operator, including UPS, operates these airplanes on a day to day basis. The FAA's Certificate Management Office in Louisville, Kentucky overseeing UPS's operation has approved every aspect of UPS's B767 operations, including crew complements, areas flown, and so forth. (Operations Specification Paragraph B050). In

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[45] Because of the regulation's significant, harmful effect on the value of UPS's aircraft, it constitutes an unconstitutional regulatory taking. *See, e.g.*, *Eastern Enterprises v. Apfel*, 524 U.S. 498 (1998); *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470 (1987); *Penn Cent. Transp. Co. v. City of N.Y.*, 438 U.S. 104 (1978).

addition, officials at FAA Headquarters in Washington, D.C. reviewed and approved the UPS extended operations (ETOPS) program applicable to the company's Boeing 767 operations. (Operations Specification Paragraph B342). The FAA never explains why it ignored this information in assessing the costs and benefits of this proposal.

5. **Impaired ability to exercise seventh freedom rights**

International aviation is governed by a complex web of bilateral and multilateral international agreements within the rubric of the Chicago Convention. Until recently, most international air service agreements were highly restrictive, limiting market entry, exit, capacity, service frequency, routings and pricing flexibility. In the late 1980s, the United States embarked on a policy of market liberalization that has fundamentally transformed international aviation. This campaign of international liberalization was formally adopted by the DOT in the mid-1990s. *Statement* at 21,841. In the intervening years this policy has proven highly successful and the U.S. has concluded over 90 open skies agreements with nations around the world including very large markets such as the European Union and, most recently, Japan. The result has been a greater choice and availability of air service at lower cost to passengers and shippers around the world.

As a result of the efforts of the United States Departments of State and Transportation, U.S. cargo air carriers enjoy unique commercial rights that are *highly valuable*. Unlike passenger airlines, air cargo airlines such UPS and FedEx may operate "seventh-freedom" services in certain markets. (Seventh freedom traffic rights enable UPS to operate flights that originate and terminate entirely outside of the United States.) In contrast, U.S. passenger carriers are limited to fifth-freedom traffic rights and may carry traffic between the territories of U.S. bilateral partners and third countries only if the flight ultimately originates or terminates in the United States. In the arena of aviation bilateral relations, cargo and passenger services have long been treated very differently. For instance, Argentina and the People's Republic of China continue to restrict the rights of U.S. passenger airlines to serve those countries but have agreed to "Open Skies" provisions for the air cargo segment of the industry.

These crucial differences in commercial freedoms allow U.S. cargo airlines to participate in numerous growing markets outside of the United States. For instance, UPS currently provides a crucial link in the growing trade between the European Union and China as a result of having seventh freedom rights in both China and Europe. As a consequence, UPS has been able to build air hubs and sorting facilities in Cologne, Germany within Europe, with additional hubs in Shanghai and Shenzen in China. FedEx operates similar services with hubs and sorting facilities in France and China. These services operate entirely outside of the United States and are valuable for both our company and our employees in terms of increased opportunities.

Again, the differences between passenger and cargo operations are instructive. U.S. passenger carriers generally do not operate true hubs outside of the United States. However, late-generation aircraft such as the Boeing 777 and 747-400 enable more non-stop point-to-point services, enabling passengers to overfly hubs. Moreover, as passenger airlines avail themselves of global alliances such as Star, Oneworld and Skyteam, they can entrust their non-U.S. partners to operate '"beyond" flight segments to third-countries thus freeing up their own aircraft to offer more point-to-point services. These same dynamics simply do not apply to the air cargo industry. Cargo customers have no preference for non-stop or connecting service for their shipments so long as they arrive within an agreed upon timeframe. Thus UPS's global hubs and sort facilities are planned, built, and sited on an entirely different set of economic and logistical premises.

The FAA apparently did not consider the vastly different nature of U.S. passenger and cargo operations in international markets when formulating its proposed regulatory text or preparing the accompanying economic analysis. If adopted in its current form, this regulation would eviscerate many of the hard-fought gains made by U.S. negotiators and would create outcomes at odds with the aims of long-standing U.S. air transportation policy. Indeed, the expansion of global cargo networks such as those of UPS are an *explicit* objective of U.S. international aviation policy. The DOT has explained that it seeks to: "[p]rovide carriers with unrestricted opportunities to develop types of service and systems based on their assessment of marketplace demand. These opportunities should apply not only to scheduled passenger services, but also to cargo and charter opportunities, because of their growing importance to the world's economy. We have long recognized the significant differences among these types of operations. *In particular, air cargo services have specific qualities and requirements that are significantly different from the passenger market.We will continue to follow our longstanding policy of seeking an open, liberal operating environment to facilitate the establishment and expansion of efficient, innovative, and competitive air cargo services.*" *Id.* at 21,844 (emphasis added).

The FAA proposal takes no stock of these policy objectives. The proposed regulation would hamstring UPS's ability to operate international services efficiently. UPS flightcrew members are domiciled in different cities in the United States. For example, a flight originating in Hong Kong and terminating in Dubai may be operated by a crew comprised of an Anchorage-based captain and Louisville-based first officer who arrived in Hong Kong on separate flights. The requirements of proposed Tables A-C to part 117 add layers of complexity to this hypothetical crew pairing, based on their respective acclimatization and different home base times. They do not take into the account the likelihood that flightcrew members based in Anchorage and Louisville may reside in and commute from a different time zone to those crew bases. Thus, the safety benefits of the proposed regulation in this scenario are speculative and turn on unregulated behavior of flight crews.

There are other foreseeable consequences in international markets that the FAA has not factored into its analysis. The proposed schedule reliability requirement in section 117.9 would harm UPS's ability to operate at capacity-constrained, slot-controlled airports such as Beijing Capital and Shanghai-Pudong. Obtaining and substituting slots at these airports, particularly the Chinese airports, is a difficult process that often requires months of negotiation with foreign civil aviation authorities, as well as the intervention of officials from the U.S. Departments of State and Transportation; these efforts sometimes do not succeed. If enforced, this regulation may require temporary suspension or even cessation of certain services in these cities while slots are adjusted for each scheduling season. Such a result would not improve safety, would harm the shipping public, and would only benefit non-U.S. competitors.

d. There are No Offsetting Cost-Savings to UPS.

In the RIA, the FAA makes several cost savings assumptions that are completely unfounded because the FAA ignores the existence of a binding collective bargaining agreement. Pilot work rules cannot be changed without the company's first negotiating with its union—in a setting where the union would have no incentive to rollback the financial gains from the new staffing levels (driven by payroll padding and reduced work hours) resulting from the proposed rule. In other respects, the FAA engages in total conjecture. For example, page 94 of the Regulatory Impact Analysis predicts that carriers will experience cost savings through reduced reserve levels because "[t]he proposed rule will reduce flight crew member fatigue, thus reducing the use of sick time." The FAA cites no evidence for this bold assertion.

e. The FAA failed to follow DOT's best practices as described in the Guide to Good Statistical Practice in the Transportation Field.

The FAA's analysis also ignores the FAA's own *Guide to Good Statistical Practice in the Transportation Field* ("*Guide*"), which provides a comprehensive set of guidelines for properly conducting statistical analysis.[46]

The *Guide*, for example, states that "[u]ntreated missing data can introduce serious error into estimates." *Id.* at 4-3. By way of example, the *Guide* explains that "given a survey of airline pilots that asks about near-misses they are involved in and whether they reported them, it is known how many of the sampled pilots did not respond," but "[y]ou will not know if the ones who did respond had a lower number of near-misses than the ones who did not." *Id.* at 4-4. Here, the FAA seems oblivious to the fact that its RIA is permeated with precisely this type of error. The FAA's analysis focuses solely on actual accidents—indeed, its analysis is predicated solely on samples of 22, 43, and 250 flights where accidents occurred in the last twenty years, taking no account at all of the *tens of millions of flights* where accidents did *not* occur. According to a study submitted by the Cargo Airline Association, "of the 22 fatigue accidents, 14 occurred during the first 19 years with 9 in the second 10 years—a 43% decrease in pilot fatigue accidents in the past 10 years. During the past seven years (2003-2009), five U.S. all-cargo carriers operated total of 7.6 million takeoffs and landings. During that time period, there were no fatigue-related accidents by any of these airlines." The FAA cannot possibly draw statistically meaningful conclusions from the paltry data set it relied upon.

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[46] Available at: http://www.bts.gov/publications/guide_to_good_statistical_practice_in_the_transportation_field/

Similarly, the *Guide* instructs that "[d]ata analysis for the relationship between two or more variables should include other related variables to assist in the interpretation." *Id.* at 4-8 to 4-9. It again illustrates the principle with an example:

[A]n analysis may find a relationship between race and travel habits. That analysis should probably include income, education, and other variables that vary with race. Missing important variables can lead to bias. A subject matter expert should choose the related variables. *Id.*

Once again, however, the FAA's RIA completely ignores this elementary principle of statistical analysis. It thus presumes causal relationships between duty and rest periods, on the one hand, and fatigue on the other, and further, between fatigue and accidents, without taking any account at all of the myriad other relevant factors, such as pilot age, pilot experience, commuting habits, aircraft types, crew composition, avionics configurations, and the like.

The *Guide* also makes clear that statistical analysis must take into account intervening changes that may make historical data irrelevant. "For example, if an analysis were performed on two years of airport security data prior to the creation of the Transportation Security Agency and the new screening workforce, the interpretations of the results relative to the new processes would be questionable." *Id.* at 4-9. Here, the FAA weighs all the accidents it considers over the last 20 years equally—as if they all occurred yesterday—taking no account of the many intervening regulations and safety advances that have limited the potential for pilot error to cause an accident.

The FAA's analysis, for example, relies on the 1995 crash of a Boeing 757 near Cali, Colombia. But in the wake of that accident, the NTSB recommended that the FAA "[e]xamine the effectiveness of the enhanced ground proximity warning equipment and, if found effective, require all transport-category aircraft to be equipped with enhanced ground proximity warning equipment that provides with an early warning of terrain."[47] Thereafter, the FAA did, in fact, mandate the Enhanced Ground Proximity Warning System ("EGPWS").[48] And in so doing, it relied upon an analysis that concluded that nine accidents that occurred between 1985 and 1995—*including the Cali Boeing 757 accident*—"could probably have been prevented" had they been equipped with EGPWS.[49] More generally, in the two decades of accidents relied upon by the FAA, more than two-thirds of the accidents occurred in the first decade (1990-1999).

Finally, the *Guide* states that "[t]he planning of data analysis should begin with identifying the questions that need to be answered." *Guide* at 4-8. Thus, here, the FAA's starting point should have been the basic question: What factors actually cause fatigue? But this question was neither asked nor answered by the FAA. Indeed, prior to proposing this rule, the FAA conducted no study whatsoever to assess whether pilot fatigue was caused by factors such as current FDP length, current practices governing nighttime flights, or the rest periods allowed by current law. Instead, the FAA merely *assumed* that these factors caused fatigue and, in turn, degraded flight safety. It thus took no account of the possibility that current regulations were adequate, but that fatigue was caused by *other* factors—such as commuting practices or boredom from cockpit automation, which can contribute to pilot fatigue. This, however, is the very opposite of how sound science, embodied in the *Guide*, dictates that statistical analysis must proceed.

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[47] A-96-90 through 106, Oct. 16, 1996 at 9, *available at* www.ntsb.gov/recs/letters/1996/a96_90_106.pdf (last visited Nov. 14, 2010).

[48] Terrain Awareness and Warning System, 65 Fed. Reg. 16,736 (March 29, 2000).

[49] Terrain Awareness and Warning System., 63 Fed. Reg. 45,628. (August 26, 1998); The cited VNTSC report appears to have been amended and finalized in March 1999. Phillips, R.O., Investigation of Controlled Flight into Terrain: Descriptions of Flight Paths for Selected Controlled Flight into Terrain (CFIT) Aircraft Accidents, 1985-1997.

In short, as Dr. Rubin and the other experts from the ATA and CAA explain, and as the FAA's own *Guide* confirms, the FAA's cost-benefit analysis, memorialized in the RIA, cannot possibly provide a rational, scientific basis for the proposed regulation. Instead, as Dr. Rubin explains, the FAA's regulatory proposal is no more likely to improve safety that a policy of "[r]andomly choos[ing] flights to forbid from taking off because this [too] will reduce total accidents." The RIA therefore cannot possibly justify the proposed regulation.

f. The FAA Has Failed To Disclose the Methodologies Underlying Its Cost-Benefit Analysis.

There are likely numerous other flaws in the FAA's analysis. UPS, however, is unable to fully assess them because, as the CAA and its expert explain in great detail, the FAA's analytical assumptions and empirical bases for the assumptions, the FAA's assessment of historical accidents relied upon in its cost-benefit analysis, and key elements of the analytical framework and key outputs (results) are not divulged or explained in the FAA report. But without this information, it is not possible to conduct a full and accurate assessment of the FAA's cost-benefit analysis.

5. THE FAA'S PROPOSED REGULATION IS UNSUPPORTED BY THE BEST AVAILABLE SCIENTIFIC INFORMATION

a. Key Aspects of the Proposed Regulation Have No Scientific Basis.

The Airline Safety and Federal Aviation Administration Extension Act of 2010 ("Airline Safety Act") requires that any new regulations be "based on the best available scientific information." P.L. 111-216 § 212. The proposed rule fails this test. The FAA's proposed crewmember duty and rest regulation is not grounded in science at all. Indeed, its fatally flawed cost-benefit analysis is the very antithesis of sound science. Morever, it does not attempt to address the behavioral factors that actually cause pilot fatigue. And precisely because it lacks a scientific foundation, the proposed rule includes requirements that will *increase* the likelihood of accidents. It is well established that many factors contribute to fatigue, including time of day, amount of recent sleep, time since awakening, cumulative sleep debt, and time on task. The proposed rule imposes burdensome requirements that will supposedly prevent fatigue by mitigating the impact of these factors. These factors, however, are already addressed in existing regulations and collective bargaining agreements. Thus, there is <u>no evidence</u> that the proposed regulation will substantially reduce pilot fatigue (or at all). More specifically, the FAA fails to cite any scientific evidence in support of the following sections of the proposed rule.

- <u>Limits on duty period extensions when flight times are within regulatory maximums</u>: The FAA provides no scientific information to support its proposal to restrict the length and weekly frequency of extensions of a crew's FDP, even when the new revised schedule is well below the maximum limits of tables B or C.

- <u>Consecutive nighttime operations</u>: The FAA proposal to limit to three the number of consecutive nighttime duty periods, unless the crewmember is provided a rest opportunity in accordance with the "split duty" provision in §117.17, is also completely unfounded. It apparently assumes that cargo carriers like UPS have hours of slack time built into their highly sophisticated operations that would allow them to comply with this requirement.

- <u>Flight time limits</u>: Every other jurisdiction that has introduced flight duty periods <u>eliminated</u> flight time restrictions and for obvious reasons: the flight duty period itself acts as a *de facto* flight time limit. The FAA identifies no scientific information that supports having both types of limitations.

- <u>Onerous FDP limits</u>: The FAA proposed limits on flight duty periods represent, at certain times, a 44% reduction from current regulations, affecting a significant number of UPS's unaugmented FDPs in both domestic and international operations. Plus, the FAA seeks to further reduce these limits based on the number of segments flown in the flight duty period. But, the FAA not only fails to identify scientific evidence that a nine or ten hour limit promotes flight safety, it concedes that "[t]here is no evidence that flying multiple segments is more fatiguing than flying one or two segments per duty period." 75 Fed. Reg. 55,858. The FAA has also failed to provide any scientific justification for the variable four-pilot FDP limits contained in Table C. The sleep scientists who participated in the ARC confirmed that there is no scientific evidence at this point to justify restrictions on ultra-long range flights (or flights that nearly approach 16 hours, the trigger for ULR classification).

- Short call reserve as "duty": The FAA's proposal to begin treating short call reserve as "duty," when it involves no more than waiting for a phone call, greatly diminishes the effectiveness of the short call reserve system and will mean that flightcrew members on short call reserve cannot receive any assignment at all after approximately the fifth day on call. Yet, the FAA provides no scientific evidence demonstrating that merely waiting for a phone to ring is "fatiguing."

- Highly prescriptive requirements for rest facilities: In support of the new proposed classification of rest facilities—which will greatly limit the ability of UPS to augment its B767 flights and receive corresponding credits for rest provided—the FAA cites only the "TNO study." This study was conducted by a foreign government and examined only passenger operations. That one study does not constitute "scientific information" regarding the quality of rest received in various facilities. The FAA identifies no equivalent studies that looked at rest facilities in cargo aircraft. Moreover, the lack of any scientific basis for this proposal is particularly troubling given that there is not a single fatigue-related accident cited in the Regulatory Impact Analysis involving an augmented flight.

- Acclimation rules: The sleep scientists who provided expert opinion at the Aviation Rulemaking Committee (ARC) proceedings explicitly acknowledged that there is an almost total absence of scientific information concerning the effects of crossing multiple time zones on fatigue.

- Restrictions on augmented-crew segments: The FAA presents no scientific basis (or really any basis) for restricting augmented operations to a maximum of three segments unless the operator has an FAA-approved Fatigue Risk Management System. If two-pilot crews may lawfully operate as many as seven or more flight segments, with as many as 14 takeoffs and landings, it is irrational to restrict augmented flight crews—who receive in-flight rest periods—to fewer segments. The FDP limits themselves should suffice to preserve safety regardless of the number of legs.

- Simulator and flight training device time as flight duty: Scientific research demonstrates that simulator training is vastly different from actual aircraft operation because the physical and emotional environments are radically different. Regardless of the outcome of any particular maneuver, nobody experiences any risk. Though required FAA checkrides are stress-inducing events, they occur during the final simulator period. The FAA provides no scientific justification for restricting training events to three consecutive nights, which will radically reduce simulator utility and drive up training costs with no demonstrated benefit. The FAA provides no valid justification for including stand-alone training sessions within its proposed definition of flight duty period.

b. The FAA Failed to Use the Best Information Available on Human Factors Contributing to Fatigue.

While proposing regulations for which there is scant or no scientific support, the FAA completely overlooks factors that indisputably *do* contribute to pilot fatigue. Pilot fatigue is not usually caused by inadequate opportunity for rest. Rather, it most often occurs when crew members, for a variety of personal reasons, do not properly *utilize* their available rest periods.

Most notable amongst these factors is commuting. Under existing—and the proposed—rules, crewmembers may plan their commutes so as to arrive at their domicile just prior to their scheduled report time, adding hours to their initial duty day. Moreover, flights are often delayed, resulting in crewmembers arriving at their domicile without any intervening rest period. For example, an east coast based crewmember may commute to Los Angeles for an afternoon report time at LAX. Thus even a single-segment duty period consisting of one transcontinental flight back to the east coast may result in a crewmember being awake for significantly longer than 14 hours upon landing. As one expert has explained:

> In view of the demonstrated importance of time since awakening as a determinant of accident risk and its role in current modeling of alertness…the issue of commute time becomes important. From a scientific perspective, there is no reason to differentiate between "deadheading" to a reporting site (which does count as duty time), and voluntary commuting to that site (which does not). One can argue that limitation of commuting time prior to reporting for duty might be as potent a determinant of safety as any reasonable limitation of either duty time or the rest time following it. Increasingly, from a scientific perspective, expert opinion is moving toward considering the commute to and from work both as a vulnerability for the worker and also as a "gray time" which should not in any way be considered recreational or restitutional. Moreover, uniquely in the airline industry, there is the issue of "cross time zone" commuting, which should be factored in to any fatigue issues related to "jet lag."[50]

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[50] Monk, Dr. Timothy H., *Position Paper*: "How Well Do the Proposed FAA Regulations Incorporate Scientific Findings Regarding Circadian Rhythms and Fatigue?" (June 17, 1996).

Pilot fatigue is likewise caused by crewmembers' otherwise improper use of their rest periods. For example, in one of the accidents FAA cites in its RIA, Continental Express Flight 2733, the crew had a rest period of over 19 hours on the day prior to the accident; however, they failed to utilize this time to obtain sufficient sleep, choosing to stay awake until 12:30 a.m. despite an early morning report time the following morning. The FAA's proposal completely fails to address this issue. Indeed, the Continental Express flight just mentioned would be entirely legal under the FAA's proposal.

Likewise, the fatigue at issue in the Federal Express flight 1478 accident, which crashed on final approach to the Tallahassee Regional Airport on July 26, 2002, had nothing to do with inadequate opportunities to rest. To the contrary, the captain's pairing would be legal under the proposed rule. The fatigue, rather, was caused by the captain's decision to sleep on the couch in his house to care for a sick dog, which caused his sleep period to be interrupted three times. Similarly, the Federal Express flight 14 crash—which consisted of one scheduled 6 hour and 38 minute flight from Anchorage, Alaska to Newark, New Jersey—also would have been entirely legal under the proposed rule.

These are but a few examples. But these and many others like them illustrate how the proposed rule imposes massive costs and burdens on all-cargo certificate holders but would not prevent the very accidents upon which the FAA relies as evidence in support of it. In short, the FAA constructed a rule that simply will not solve the problem it has identified because it ignores the main causes of that problem while, at the same time, regulating operational matters that have not been shown to be related to pilot fatigue. This is the very definition of an arbitrary and capricious regulatory regime.

The FAA, moreover, has crafted a schedule that will ensure the public cannot meaningfully comment on information from the National Academy of Sciences (NAS) that Congress required the FAA to obtain on this type of crewmember behavior. Section 212 of the Airline Safety Act set up the following series of dates for consideration of the commuting issue:

- <u>September 30, 2010</u>—FAA Administrator to contract with NAS to perform a study on the effects of commuting on pilot fatigue, which would consider:
    - (A) the prevalence of pilot commuting in the commercial air carrier industry, including the number and percentage of pilots who commute;
    - (B) information relating to commuting by pilots, including distances traveled, time zones crossed, time spent, and methods used;
    - (C) research on the impact of commuting on pilot fatigue, sleep, and circadian rhythms;
    - (D) commuting policies of commercial air carriers (including passenger and all-cargo air carriers), including pilot check-in requirements and sick leave and fatigue policies;
    - (E) postconference materials from the Federal Aviation Administration's June 2008 symposium titled "Aviation Fatigue Management Symposium: Partnerships for Solutions";
    - (F) Federal Aviation Administration and international policies and guidance regarding commuting; and
    - (G) any other matters as the Administrator considers appropriate
- <u>January 28, 2011</u>—NAS to report its preliminary findings to the FAA.
- <u>January 28, 2011</u>—FAA to issue its Notice of Proposed Rulemaking with an unspecified period for public comment to follow.
- <u>July 1, 2011—</u>NAS to provide report to FAA on its findings and make recommendations for regulatory or administrative actions by the FAA concerning commuting by pilots. After receipt, the FAA Administrator is to "update, as appropriate based on scientific data," the proposed regulations.
- <u>August 1, 2011</u>—FAA Administrator to issue Final Rule.

While Congress did not explicitly forbid the agency from moving more quickly at any stage, it obviously envisioned that there would be an orderly process in which there would be public comment on any proposed rule *after* the NAS had issued its preliminary findings. By jumping the gun—and issuing an NPRM well before the date Congress anticipated and before it received those findings—the FAA has effectively deprived the public of any opportunity to comment on this critical issue. As if that were not enough, it has requested that the National Research Council form a Committee on the Effects of Communiting on Pilot Fatigue, but this Committee will not even hold its first meeting until November 22, 2010—which is 7 days *after* comments on the NPRM are due.[51]

The patent unfairness of this approach is exacerbated by the FAA's refusal to grant any extension of time to comment on the NPRM even though, if adopted, it would be the most significant change to aviation regulation in modern times. Indeed, the FAA refused any extension even though it did not publish "clarifying answers" to the dozens of ambiguities clouding the NPRM until October 22, 2010, leaving just 23 days to analyze the NPRM as "clarified" by the FAA. In contrast, in 1995, under similar circumstances, the FAA extended the original 60-day comment period by an additional 90 days.

In short, notwithstanding the obvious importance of pilot personal conduct, the proposed regulation fails to address this issue <u>at all.</u>

Nor is the FAA's "self-certification" proposal in §117.5(f) an excuse for FAA's failure to address these critical causes of fatigue. If the FAA deems it sufficient for crewmembers to declare their fitness for duty merely by signing a flight or dispatch release, then it is equally appropriate for certificate holders to certify that, to their knowledge, flight crews report for duty

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[51] UPS also objects to the FAA's issuance of Advisory Circular 120-FIT. The FAA should incorporate the NRC's findings, and thus the FAA should wait to issue this advisory circular until the NRC's findings are published.

alert. But no one—and certainly not the FAA—has advocated for such a regimen. It is therefore illogical for the FAA to impose costly and prescriptive limits on employers purportedly to mitigate fatigue—with <u>no evidence</u> that existing rest regulations are inadequate or that the proposed regulation will be effective—while completely ignoring commuting and other human factors that clearly do subject the employees to fatigue.

c. FAA's proposal will *increase* the likelihood of accidents by necessitating more "first night" operations.

Even worse, the proposed regulation is likely to actually degrade flight safety. Experience demonstrates that the first nighttime duty period is the most difficult because the pilot is unaccustomed to being awake at night. 75 Fed. Reg. 55,867. The FAA proposal, which apparently would limit to three the number of consecutive nighttime flight duty periods unless UPS can alter its business model, will result in its crews experiencing more "first nights."[52] Accident data demonstrate that the *first* duty period in which a crew is paired together is (by far) the most risky and most likely to involve an accident. Consequently, if adopted, the proposed regulation will *increase* the likelihood of accidents.

To exceed three consecutive nights, flight crews must receive a minimum four hour rest opportunity in a suitable accommodation. This rest, moreover, is required during each night, not just during the third night. The sort operation, which typically begins with the first wave of inbound flights at around 11:00 pm, and ends with the first wave of outbound flights at around 3:00 am, simply does not allow enough ground time to provide a four hour rest opportunity. Thus, UPS's current program which attempts to provide week on/week off scheduling standard for our crews will have to be changed to include two and three day trip pairings every week, which also will result in more fatigue. The net result is that our flightcrew members will

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[52] For a more complete discussion of this issue, *see* footnote 18, *supra*.

experience more first night operations, thus exposing the operation to *greater* risk than current rules.

Actual sleep science demonstrates that any sleep over 20 minutes provides recuperative rest on a one-for-one basis. Gregory Belenky, M.D. & R Curtis Graeber, Ph.D, Scientific Issues Regarding NPRM 3 (Nov. 5, 2010). Our flightcrew members typically enjoy, on average, at least a two hour rest in our state of the art sleep facilities. The proposed regulation fails to recognize this restorative rest. Further, this new scheduling paradigm will reduce the length of our flightcrew members' off duty periods. Our substantial experience demonstrates that an entire week off between a series of flight duty periods, which many UPS crews now receive thanks to our scheduling system, provides a truly restorative recovery period. Switching from week on / week off scheduling will reduce the number of consecutive days off our crewmembers currently enjoy, lessening their ability to fully recover before being scheduled for further duty.

In light of the foregoing, UPS strongly recommends that the FAA not restrict consecutive nighttime operations. Should the FAA choose to restrict consecutive nighttime operations, UPS strongly encourages the FAA to allow certificate holders credit for sleep opportunities that would meet the scientific evidence demonstrating a recuperative benefit on a one-for-one basis beyond 20 minutes of sleep opportunity. The FAA fails to provide any scientific evidence that a minimum four-hour sleep opportunity is required for sustained performance.

d. The FAA seems to have ignored its own scientific findings.

The FAA's review of scientific literature and data did not even include some of its own research that could have informed the agency's analysis of how fatigue may be detected and mitigated. For example, in footnote 17 on page 55,858 of the NPRM, the FAA states it used "[b]io-mathematical modeling of fatigue and performance" because other "objective measures are conspicuously lacking in fatigue science," explaining:

> Bio-mathematical modeling of fatigue and performance can assist in providing objective metrics, which are conspicuously lacking in fatigue science. The rationale for modeling is that conditions that lead to fatigue are well known. A model simulates specific conditions and determines if fatigue could be present. Models can estimate degradations in performance and provide an estimate of schedule-induced fatigue risk that considers many dynamically changing and interacting fatigue factors.

This observation, however, is seemingly at odds with FAA-sponsored research. In particular, sixteen years ago, the FAA's Office of Aviation Medicine published two papers that do set out objective methods for measuring fatigue and performance.The first paper is titled *Blink Rate As a Measure of Fatigue: A Review* and was prepared by researchers from Washington University and the FAA Civil Aeromedical Institute.[53] The researchers concluded that, "[i]t is, in our opinion, abundantly clear that there are well defined conditions in which TOT [Time on Task] effects are reflected in an increase in blink rate. We agree with a number of earlier investigators, such as Katz, Luckiesh, Carpenter, Haider, and Rohmert, to mention but a few, who came to the conclusion that blink rate is a reflector of TOT or fatigue effects." *Id.* at 10.

The same office published a separate paper that year titled *Blinks, Saccades, and Fixation Pauses During Vigilance Task Performance: I. Time on Task,*, prepared jointly by researchers from Washington University, the FAA Civil Aeromedical Institute, and the Russian State Scientific Research Institute for Civil Aviation .[54] In this study the researchers asked, "[c]an gaze control measures be used to reflect, and hopefully to predict, periods of impaired vigilance?" They concluded that, "[t]he results of this study clearly demonstrate that number of eye movements and eye blinks show significant TOT [Time on Task] effects." *Id.* at i. The

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[53] Stern, J.A., Boyer, D., Schroeder D.J., *Blink Rate As a Measure of Fatigue: A Review.*, DOT/FAA/AM-94/17 (1994), available at http://www.faa.gov/library/reports/medical/oamtechreports/1990s/media/AM94-17.pdf

[54] Stern, J.A., Boyer D., Schroeder D., Touchstone M., Stoliarov, N. *Blinks, Saccades, and Fixation Pauses During Vigilance Task Performance: I. Time on Task.* DOT/FAA/AM-94/26 (1994), available at http://www.faa.gov/library/reports/medical/oamtechreports/1990s/media/AM94-26.pdf

researchers included the caveat: "TOT and 'fatigue' effects will be used synonymously." *Id.* at 1. The subjects of the research were twenty individuals performing simulated air traffic control functions. *Id.* at 3.

Neither of these studies were cited in the FAA's bibliography of scientific literature. The FAA seems to have ignored its own research, which unlike other articles, has the advantage of a nexus to the aviation context.[55] In addition to these studies, the FAA has published a handbook specifically for human factors and flightdeck research describing various methodologies and techniques to measure flight crew performance.[56] It is unclear whether the FAA performed any research pursuant to the handbook prior to formulating this proposal.

Perhaps as a consequence of these omissions or oversights, there is no indication that the FAA employed or even attempted to employ any form of fatigue measurement among flight crews to gather the data necessary to formulate and propose useful regulatory countermeasures.

e. The FAA relied on anecdotes in absence of actual science.

On page 55,860 of the NPRM, the FAA described its reasoning in limiting the number of hours in an FDP. It wrote, "[a]lthough not addressed by sleep studies, the FAA has also tentatively decided to reduce the amount of available FDP depending on the number of legs flown (flight segments) because of a general agreement among the ARC members and FAA staff previously employed as pilots by commercial air carriers that multiple take-offs and landings are more fatiguing. Much of the available science is based on laboratory studies, with exceptionally

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[55] This is in contrast to the only arguably similar title the FAA does cite. Lobb ML, Stern JA. Pattern of eyelid motion predictive of decision errors during drowsiness: oculomotor indices of altered states. Invest Ophthalmol Vis Sci 1986; 30:17.

[56] Rehmann, A.J., *Handbook of Human Performance Measures and Crew Requirements for Flightdeck Research*, DOT/FAA-CT- TN95/49 (1995), *available at* www.tc.faa.gov/its/worldpac/techrpt/cttn 95-49.pdf (last visited Nov. 14, 2010).

limited validation in the aviation context; accordingly, the FAA has tentatively decided to rely on the experience of these individuals rather than assuming no adverse impact on safety."

The unexamined, undisclosed anecdotes of the FAA staff, however, cannot possibly form a legitimate basis for this rule. As described by Dr. Rubin, the FAA-funded studies on LOSA and other sources we cite, causal relationships between negative outcomes and potential triggers can only be established looking at data from successful and unsuccessful flight operations. In this case, the FAA cannot even identify an actual, documented negative outcome in terms of aviation safety and ignores millions of positive outcomes. The FAA has proven neither a causal relationship between fatigue and safety nor a causal relationship between number of legs and fatigue. Moreover, in relying on a purely anecdotal correlation between fatigue and the number of legs flown and further making a leap to causation, the FAA's proposed position does not account for areas of fatigue science for which there is evidence. For instance, there is research indicating that other causes of fatigue may include boredom experienced during long-distance flights consisting of a single leg or from the monotony resulting from increased cockpit automation.[57] Finally, this type of anecdotal evidence is immune from analysis, since it is impossible to ascertain whether these undisclosed anecdotes are even relevant to the issue at hand.

f. The FAA proposal will create new risks.

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[57] *See generally*, Strauss, S., *Pilot Fatigue, available at* http://aeromedical.org/Articles/Pilot_Fatigue.html;

Weitzel, T.R., & Geraci, J.A., *The Construct of Fatigue: A Model for Aviation*, *available at*, https://hfskyway.faa.gov/(A(Lth2wzpEywEkAAAAMDExYTU2ZGItMGQ4YS00NjViLWFkOGEtMGE2Y2JlMzA3NTdht4RiDm1ayyGq7npl13dHGb5cu4I1))/HFTest/Bibliography%20of%20Publications%5CHuman%20Factor%20Maintenance%5CThe%20Construct%20of%20Fatigue%20%20A%20Model%20for%20Aviation.pdf;

Ahlstrom, V. Longo K., Truitt, T. Human Factors Design Guide Update (Report Number DOT/FAA/CT-96/01): A Revision to Chapter 5 -- Automation Guidelines (2002), available at http://www.hf.faa.gov/docs/508/docs/hfdg_ch_5_update.pdf.

The FAA proposal would disturb a mature, stable, and demonstrably safe system. This disturbance will inevitably generate new and unforeseen risks. These risks pose a hazard that the FAA has not attempted to understand. Indeed the worst aviation accident in history seems to have been precipitated, in some part, by changes to flight and duty regulations that made them more rigid and complex and caused pilot distraction. On March 27, 1977, a KLM B747 collided with a Pan American B747 at Tenerife, Spain during its takeoff roll killing 583 people on both airplanes. The report prepared by Spain's Ministry of Transportation and Communication and transmitted to the US NTSB dated November 16, 1978 stated the following:

> Socio-psychological causes: 1. Limits on duty time of Dutch crews: Until a few years ago, the Flight Captain was able, at his own discretion, to extend the limit on his crew' activity in order to complete the service. However this was recently changed in the sense of imposing absolute rigidity with regard to the limit of activity. The Captain is forbidden to exceed it and, in case he should do so, may be prosecuted under the law. Moreover, until December 1976, it was very easy to fix said limit of activity by taking only a few factors into account, but this calculation has now been made enormously complicated and in practice it is not possible to determine it in the cockpit; for this reason it strongly recommended that the Company should be contacted in order to determine it. This was the situation in Tenerife, and for this reason Captain Veldhuyzen spoke by HF to Company's operations office in Amsterdam. There they told him that if he was able to take off before a certain time it would seem there would be no problems, but that if there was any risk of exceeding the limit they would send a telex to Las Palmas. This uncertainty of the crew at not being able to determine their time limit exactly must have constituted an important psychological factor. Id. at 106 (emphasis added).

The cockpit voice recorders captured what seem to be indications of the Captain's state of mind. The report states, "[i]t transpires from careful listening to the K.L.M. CVR that although cockpit operation was correct and the checklists were adequately kept, there was some feeling of anxiety regarding a series of factors, which were: the time margin remaining to them, to the point of straining the allowable limit of their duty time;" *Id.* at 118. The FAA proposal would re-introduce several of the factors cited by Spanish authorities. The rules are so complex that it would be nearly impossible in some circumstances for a flight crew to determine or predict their compliance status particularly in dynamic, uncertain conditions. The proposed rule also has the attribute of rigidity which may compel flight crews into making sub-optimal decisions based considerations other than safety.

6. THE FAA IGNORES NUMEROUS ALTERNATIVES THAT WOULD PROVIDE EQUIVALENT SAFETY BENEFITS AT FAR LESS COST TO THE INDUSTRY.

The FAA relied on the ARC Recommendations in formulating the proposed regulation. But the ARC cannot substitute for the FAA's duty to engage in reasoned decisionmaking and, in any event, marginalized the views of the cargo industry. As a result, in crafting the proposed regulation, the FAA ignored numerous regulatory alternatives that could achieve the same levels of safety while imposing far fewer burdens on the cargo airline industry.

a. The ARC Process

In denying the many requests for more time to respond to the proposed regulation, the FAA stated, "The ARC provided a forum for the aviation industry to give extensive input on revising current flight and duty time limitations regulations. Therefore, the FAA does not believe it is necessary to extend the comment period for the proposed rule." 75 Fed. Reg 63,425. The ARC, however, cannot and was never intended to be a substitute for notice and comment rulemaking under the APA and, in any event, gave no serious consideration to the cargo industry's concern.

The ARC was a closed body and those admitted had unequal standing. UPS, for example, was accorded only "observer" status with limited rights to participate. In particular, UPS was not permitted to express views without the consent of the Committee co-chairs. The ARC process, moreover, had a built-in bias in favor of passenger airlines and against the all-cargo business model. For example, the ARC's two co-chairmen, one representing management and the other labor, were both ALPA pilots employed by Delta Airlines, a passenger airline. These co-chairmen, therefore, understandably lacked a full understanding of how the regulation would affect the all-cargo area in which UPS operates.

Likewise, the ARC deliberations were based on the ATA/ALPA "working" document, which was informally circulated among the industry ARC members and observers at the beginning of the ARC process. This working document followed models provided by EU Ops-Subpart Q and CAP-371 (UK), with modifications that accommodated the traditional passenger airline business model. It was not, however, well-suited for all-cargo airlines like UPS. The ARC deliberations then centered around that work, and at no time were opportunities for alternative concepts given real consideration in the subsequent proceedings.

As the ARC process unfolded, the all-cargo industry concerns became yet further marginalized. In particular, early in the ARC process, UPS began to raise objections, pointing out the many problems that the working document posed for the all-cargo business model. Some participants, however, became concerned that these objections were slowing down deliberations. The FAA representative therefore suggested that, instead of attempting to amend the working document to address these concerns, they be addressed separately in a proposal put forth by the cargo carriers. The Cargo Airline Association ("CAA") therefore proceeded to develop a separate, alternative proposal and, accordingly, the concerns specific to cargo operators were largely tabled with the understanding that they would be addressed when this alternative proposal was considered. However, the ARC never seriously considered the CAA's alternative proposal when it arrived other than to provide an opportunity for the CAA industry representative to provide a briefing at the ARC proceedings. Ultimately, the CAA proposal was relegated to an attachment in the ARC report.

In short, the ARC never gave serious consideration to the cargo industry's concerns or the different ways those concerns could be addressed consistent with the desire to promote safety. Instead, the FAA based its policy choices on recommendations from a committee that made no attempt to represent cargo express carriers and relegated the proposal of their trade association to the dustbin. Accordingly, the ARC process cannot possibly substitute for the FAA's obligation to engage in reasoned decisionmaking.

b. The FAA Ignored Several Realistic Alternatives To Its "One Size Fits All" Approach.

The FAA failed to give serious consideration to numerous alternatives that would achieve similar safety benefits while furthering airline safety at least as much as the proposed rule.

i. The CAA Proposal

An obvious and readily available alternative is the proposal prepared by the CAA during the ARC process. Unlike the proposed regulation, the CAA proposal accounts for the realities of the cargo airline industry while, at the same time, addressing each of the elements the FAA seeks to address in the proposed regulation.

The CAA proposal would adopt the following requirements with respect to domestic operations:

- Rest periods. Increase the minimum rest period from the current minimum of 8 hours to 10 hours—a 25% increase. This period could be reduced to 9 hours no more than one time in any 168 hour look-back period. Moreover, crew members would receive a 24 hour rest period in any 168 hour look-back period.

- Flight Duty Period. Decrease the length of the FDP from the current maximum of 16 hours to between 9 and 13 hours (depending on the time of start and number of flight segments)—an 18% to 43% decrease.

- Flight Time. Establish flight time limits of between 7 and 11 hours depending on the time of start and number segments to the extent that FAA deemed any such limits necessary. The CAA contends that separate limits for flight time are actually unnecessary, as the restrictions on FDP and minimum rest period would together ensure adequate rest and duty periods of sound duration.

The CAA proposal would adopt the following requirements for non-augmented, international all-cargo operations:

- Rest periods. Increase the minimum rest period from the current minimum of 8 hours to 12 hours—a 50% increase. This period could be reduced to 11 hours no more than one time in any 168 hour look-back period. Moreover crew members would receive a 30 hour rest period in any 168 hour look-back period.

- Flight Duty Period. Establish FDP limits between 11.5 to 14 hours depending on whether flight occurs during the WOCL, whether the crew is acclimatized, and the number of sectors.

- Flight Time. Establish limits of between 8 and 12 hours depending on the WOCL, composition of flight crew complement, and whether the flight crew is acclimatized to the extent that FAA deemed any such limits necessary in light of the adoption of Flight Duty Periods.

With respect to augmented international all-cargo operations, the proposal would:

- Rest periods. Increase the minimum rest period by 50% from the current minimum of 8 hours to 12 hours. This period could be reduced to 11 hours no more than one time in any 168 hour look-back period. Moreover, crew members would receive a 30 hour rest period in any 168 hour look-back period.

- Flight Duty Period. Establish limits between 14.5 to 16.5 hours depending on number of segments and contingent upon the availability of a horizontal sleep opportunity.

- Flight Time. Maintain current limits of 12 hours to the extent the FAA deemed any such limits necessary in light of the adoption of Flight Duty Periods.

The CAA proposal was constructed based on scientific literature, collective institutional knowledge of all-cargo operations, analysis of data from actual operations, and special considerations, such as the need to avoid long stays in places like Afghanistan. The FAA's proposed regulation, however, completely ignores this proposal. Indeed, the NPRM does not address the substance of this alternative at all. Rather, the sum total of the NPRM's discussion of why the FAA believed that the "one size fits all" rule is necessary is the cursory conclusion that "there are no physiological differences between pilots who fly cargo planes and pilots who fly passenger planes. As noted before, the FAA believes the distinctions between domestic and international operations are largely irrelevant." 75 Fed. Reg. 55,863. Needless to say, this "reasoning" cannot possibly justify the FAA's decision to adopt, for the first time in aviation history, a regulatory regime that denies the enormous differences between airline operations that carry people and those that transfer cargo. To the contrary, the summary rejection of an entire industry's concerns is the antithesis of reasoned decision-making.

ii. Performance-Based Alternatives

Alternatively, to the extent the FAA sought to have a uniform regulation for all operators under Part 121, it could have drawn upon its own vast expertise gained from the aircraft certification and other realms where it has routinely formulated far less prescriptive, performance-based rules. Performance based regulations—now preferred by the FAA under its own policies—are the opposite of the "one size fits all" approach used here. They recognize that a uniform level of safety and risk mitigation may be achieved through varying means, so long as the effectiveness of those means is supported by valid statistics. As stated in Advisory Circular 120-79A dated September 7, 2010, which applies to air carrier maintenance programs, "[p]erformance-based regulation is a regulatory approach that focuses on measurable outcomes, rather than prescriptive processes, techniques, or procedures. Performance-based regulation leads to defined results without a specific direction or specific instruction in the regulation regarding how to obtain those results."[58] Performance based regulations do not dictate business models. Nor do they inhibit innovation in the way that overly prescriptive regulations tend to.

Many of the current regulations governing flight and duty time date back to the 1940s when aircraft were much less capable in terms of speed and range. The industry was also far different. There were no cargo airlines such as UPS, no competing hub-and-spoke networks, or low cost carriers. Regulators could not have imagined the types of operations that these regulations would eventually cover, such as ultra long range flights of 16 or more hours in airplanes requiring only two pilots at any one time. Indeed, ultra long range flight operations are a recent phenomenon and have only commenced in the last 10-15 years. The next seventy years are no less likely to herald dramatic change in business models and technology.

Promulgation of a highly-prescriptive regulation that is, at its inception, incongruous with the realities of the airline industry, would be a costly and unforced error. The public, the industry, and the agency would be better served with a minimally prescriptive regulation allowing individual carriers to adapt based on the nature of their operations and future innovation.

iii. Existing Regulation as a Template

Alternatively, the FAA could have used the rest and duty requirements of 14 C.F.R. Part 91, Subpart K[59] ("Subpart K") as the basis for a flexible, minimally prescriptive set of regulations to ensure a uniform level of safety across the spectrum of operators. The flight crew members subject to these Subpart K provisions are paid commercial pilots who hold comparable qualifications in terms of flight experience and FAA licenses. *See* 14 C.F.R. § 91.1053 (2010).

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[58] *See also* FAA Order 8900.103 Appendix A, which states: "Performance-based regulation is a regulatory approach that focuses on measurable outcomes, rather than prescriptive processes, techniques, or procedures. Performance-based regulation leads to defined results without a specific direction or specific instruction in the regulation regarding how those results are to be obtained."

[59] 14 C.F.R. §§ 91.1057-91.1061 (2010).

Subpart K incorporates many of the elements and concepts included in the FAA's proposal and existing Part 121 regulations, such as operations across multiple time zones, crew augmentation, and sleeping facilities. The regulation also contemplates a full spectrum of operations including those with extended duty periods as long as 18 hours with augmented crews of three or four pilots. Subpart K could be readily modified to include all other factors enumerated in the statute that required the current rulemaking, such as the "time of day of flights in a duty period" and "number of takeoff and landings in a duty period." Pub. L. No. 111-216, § 212(a)(2), 124 Stat. 2362 (2010). Moreover duty time limitations and minimum rest periods could also have been set at levels scientifically determined to be appropriate for Part 121 operation.

The appeal of Subpart K as a template is its simplicity and thus flexibility. Rather than prescribing or proscribing certain business models, it focuses on assuring crew members are protected from duty periods beyond a certain length and provided rest of a minimum duration. This simplicity, flexibility, and tight focus of Subpart K suggest that a derivative proposal would likely prove to be a far better regulation than existing provisions of Part 121 or those within the NPRM, while flexible enough to bear structural economic changes and technological innovation. To the extent the FAA seeks to have a single, uniform regulation, it should now consider a derivative based on Subpart K as the template.

iv. Status Quo

Furthermore, the FAA failed to consider an alternative that would leave the current rules in place with modest changes to deal with actually identified problems. Executive Order 12866—which sets out the basic principles for agencies' cost-benefit analysis (and the FAA itself recognizes as governing here, *see* 75 Fed. Reg. 55,876)—makes clear the need to consider this alternative of minimal or no change: "In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating." Exec. Order 12,866, at 1. In particular, a significant regulatory action requires "[a]n assessment, including the underlying analysis, of costs and benefits of potentially effective and reasonably feasible alternatives to the planned regulation, identified by the agencies or the public (including improving the current regulation and reasonably viable nonregulatory actions), and an explanation why the planned regulatory action is preferable to the identified potential alternatives." *Id.* at 7.

The FAA, however, did not consider modest improvements to the current regulation at any point in the rulemaking process. The cost-benefit analysis, which shows a nearly $600 million net loss from the new regulation, does not analyze whether that loss could be mitigated by keeping more of the current regulations. Indeed, from the very start of the ARC process, the goal was established to create "[a] single approach to addressing fatigue that consolidates and replaces existing regulatory requirements for parts 121/135." FAA, ARC Charter at 1 (June 24, 2009). Thus, contrary to Executive Order 12866, the FAA insisted on wholesale change before considering the scientific basis or cost-benefit consequences of such a change.

v. Other Alternatives Modifying the Proposed Rule

At a minimum, the FAA must evaluate an alternative that takes into account the prominent operational differences between cargo and passenger airlines. Such an alternative would, at a minimum, include the following elements:

- <u>Schedule Reliability</u>: This section, which requires flight duty periods to conclude within their scheduled duration 95% of the time, will impose substantial costs on UPS because UPS will have to modify its flightcrew member schedule construction. Certificate holders should be required to report only actual flight duty periods that exceed the Table B or C limits. The reporting interval should be harmonized to match seasonal schedule changes and IATA slot conferences (i.e., two times per year).

- Flight Duty Period Limits: The FAA's proposed maximum flight duty period limits during certain times of day are arbitrarily restrictive. At minimum, the FAA should adopt limits consistent with analogous international law, where the most restrictive flight duty period is 11 hours.

- Flight Duty Period Extensions: The arbitrary limits on flight duty period extensions severely limit a certificate holder's ability to complete a planned operation during both normal and off-schedule operations. Unlimited flight duty period extensions up to the maximum Table B and C limits should be permitted. Extensions beyond the Table B or C limits should be limited to two times in any 168 consecutive hour period.

- Reserve Status: Reserve status was one of two areas in which the ARC reached consensus; inexplicably the FAA departed from the ARC recommendation in favor of a provision that would prevent certificate holders from utilizing reserve pilots for their intended purpose—maintaining system integrity during off-schedule operations. The FAA should adopt the ARC's consensus recommendation.

- Overly prescriptive definitions of "rest facilities": The proposed regulation's overly restrictive limits on rest facilities have not been adopted anywhere else. The United States should not be the first. Instead, the current Advisory Circular, AC 121-31, should remain in effect at least until the FAA conducts a study consistent with scientific principles using valid aviation data.

- Consecutive nighttime operations: The restrictions on nighttime operations are not supported by science and will introduce more fatigue risk into flight operations by creating more "first nights." Instead, in accordance with current sleep science, certificate holders should receive sleep credit on a one-for-one basis for rest opportunities after 20 minutes. Thus, two hours in the sleep facility would yield a 1 hour and 40 minute credit.

7. COMMENTS ON VARIOUS REGULATORY PROVISIONS AND ANSWERS TO FAA QUESTIONS

The proposed regulations are unwieldy, operationally untested and inflexible. They completely fail to accommodate the real-world challenge of operating a global cargo airline. This becomes even more apparent when attempting to overlay these proposed rules on top of collective bargaining agreements or in light of circumstances affecting operations including: weather events, air traffic control delays, aircraft mechanical problems, last minute crew illnesses and family emergencies, habitual ATC labor strikes (Europe) and late customer package drop-offs. Any new regulations must afford UPS the opportunity to address these issues.

The remainder of this section includes UPS's additional comments with respect to the specific proposed regulatory provisions. UPS's responses to the specific preamble questions are included as an appendix.

i. §117.1 Applicability

Although the FAA's clarifying answer makes clear that this provision applies only to "flights conducted by part 121 certificate holders," UPS suggests that the regulatory language in any final rule make this point explicitly. As currently drafted, the regulatory language can be interpreted in a manner that would apply the prescriptive limits of part 117 to all part 91 flying engaged in by crewmembers.

ii. §117.3 Definitions

6. Acclimated: As "acclimation" is predicated on being "free from duty," UPS is concerned about the potential for having administrative duties interfere with a crewmember's ability to acclimate and about other means to manipulate duty to alter rest and FDP report times. If a crewmember revises company manuals or navigation charts during a duty free period (e.g., while on layover), or prior to his or her report time, it is possible, without further clarification, that such crewmember would not satisfy the definitional test of being acclimated or could drive different FDP limits based on when they claim their duties started. UPS suggests that the FAA remove administrative duties from the definition of duty or exempt administrative duties from influencing acclimation.

7. Airport/standby Reserve: The FAA's definition of airport/standby reserve (i.e., at or *in close proximity to*) is too vague and open to interpretation. UPS suggests that FAA redefine airport/standby reserve as an assignment that requires a crewmember to be in a position to begin preflight activities following notification of an assignment without requiring additional travel time to arrive into the operation.

8. Deadhead Transportation: The proposed definition fails to address deadhead transportation on aircraft not configured for passenger operations (i.e, all-cargo aircraft). UPS suggests the FAA revise the definition as follows: "Deadhead transportation means transportation of a crewmember as a passenger, non-assigned flight deck occupant, or other additional crewmember by air or surface

transportation, as required by the certificate holder, excluding transportation to or from a suitable accommodation."

9. Duty: The addition of administrative duty, as defined, presents a nearly impossible situation for certificate holders to track and manage. UPS suggests that the FAA replace "*on behalf of…*" with "*as directed by*…." For example, a flight crewmember might decide to review his schedule "on behalf of the certificate holder," but that activity would not be considered duty if done by choice. With respect to considering all "administrative" work performed by a management pilot as duty, UPS believes that the unintended consequence is that all management pilot positions will become non-flying positions. This will negatively impact the safety and efficiency of all line operations. UPS recommends that the FAA specifically address the issue of management pilot duty as follows: "Management pilot duty includes all time spent during company business-related meetings and other business-related activity conducted on company property. Communications of any form during periods that a management pilot would ordinarily be considered off duty does not constitute duty for purposes of this regulation."

10. Duty Period: Defining the end of the duty period as "…*free from all duties*" is too ambiguous and uncertain. A certificate holder cannot control voluntary duties that a crewmember may decide to accomplish at the end of his/her FDP. UPS suggests that the definition of duty period should be changed so that the end of the duty period occurs when the crewmember is *"…released from all company-directed duties."*

11. Fit for Duty: To include "…duties in flight with the *highest* degree of safety" in the definition of "fit for duty" is not practical and too subjective. It is unrealistic for any human to be at their "highest" level of performance during every possible FDP. For example, someone could function at a "high" degree of safety but still not be at his or her "highest" degree of safety. UPS suggests replacing "…*highest degree of safety"* with "…*capable of performing duties that assure flight safety.*"

12. Flight Duty Period: Including simulator or flight training device ("FTD") time, by itself, in the definition of flight duty period is arbitrary and not supported by scientific evidence. FAA should not be regulating matters that are traditionally addressed via collective bargaining agreements. UPS does support counting time spent in simulator or FTD training as part of an FDP, but only if it immediately precedes flight duty without an intervening rest period. One unintended consequence of treating simulator and FTD time as FDP time, regardless of when that training occurs, is that the practice of providing additional training to a crewmember who feels they need or want additional training will be discontinued, which would adversely affect flight safety.

13. Rest Facilities: The definition of Class 2 rest facility fails to address rest facilities on aircraft configured without a passenger cabin (i.e., all-cargo aircraft). UPS suggests the definition should read: *"In an aircraft configured with a passenger*

cabin, Class 2 rest facility means a seat that allows for a flat or near flat sleeping position and is separated from passengers by a minimum of a curtain to provide darkness and some sound mitigation, and is reasonably free from disturbance by passengers or in-flight crewmembers. In an aircraft not configured with a passenger cabin, Class 2 rest facility means a seat that allows for a flat or near flat sleeping position."

14. Scheduled: This definition does not address re-schedules that occur during an FDP; it addresses only the schedule that was assigned when the crewmember reported for duty. UPS suggests the definition should be modified as follows: "*Scheduled means times assigned by a certificate holder when a crewmember is required to report for duty or has been given a re-schedule during the FDP that fully complies with the requirements of this part.*"

15. Schedule Reliability: Defining the measurement of schedule reliability as the comparison of an actual FDP to a scheduled FDP has absolutely no fatigue or safety implications. For example, exceeding a scheduled 2 hour FDP by 45 minutes in no way impacts safety or crew fatigue. The definition should match the preamble description: *"Schedule reliability means the accuracy of the length of a scheduled flight duty period as compared to the maximum FDP listed in either Tables B or C (as applicable)."*

16. Unforeseen Operational Circumstance: This definition is not consistently used. Within the regulations, the term "unforeseen circumstance" is used in proposed regulation § 117.15, and § 117.19, but that wording does not match the wording of this defined term. UPS suggests maintaining the current definition of "*beyond the control of the certificate holder*."

iii. §117.5 Fitness for Duty

Within §117.5(a), the regulation should indicate that the crew should be prepared to perform up to the maximum time limits established in this part. UPS suggests the regulatory language be changed as follows: "*Each flight crew member must report for any flight duty period rested and prepared to perform his or her duties up to the maximum time limits established in this part."*

Within §§ 117.5(b) and (c), the proposed regulation uses the term "*too fatigued*," which is subjective and not appropriate in the regulatory context. UPS suggests the regulatory language be changed as follows: "*…unfit for duty due to the onset of fatigue that would compromise the ability to safely perform his or her assigned duties."*

Within §117.5(d), the draft regulatory language, *“Any person who suspects…must…”* is extremely broad, vague, and undefined. As drafted, this section places a legal burden and liability on individuals who have no idea that they are subject to this regulation (e.g., people who have received no professional training in fatigue awareness and diagnosis). Further, we believe this regulation presents a problem with existing ADA and HIPAA regulations and could expose individuals to potential litigation by employees who are being falsely accused of being fatigued because they exhibit fatigue-like symptoms due to other medical conditions. This regulatory language also presents a clear and easy opportunity for abuse by “any person(s)” who wish to embarrass or harass a flight crewmember since no medical standards exist as to what constitutes a fatigued individual. UPS believes the FAA intends that this requirement apply to only to those people required to receive training as directed in § 117.11 and, therefore, that the FAA should clarify the scope of the burden this section imposes. In addition, UPS suggests replacing the word “suspects,” which is too vague for use in the regulatory context, with “*reasonable basis to believe....”*

With respect to §117.5(e), there are no known medically-verified objective measures to evaluate an individual for fatigue, even for medically-trained professionals. Other parts of Federal law prohibit individuals from practicing medicine or conducting medical evaluations without proper certification and/or credentials. Without clear and unified evaluation standards conducted by a medically qualified individual (e.g., medical doctors), there is no protection for the crewmember against abuse by management or others by creating an environment that promotes subjective claims by individuals that a flight crewmember is “unfit for duty.” Additionally, there is no protection from liability for a certificate holder for misjudging a true case of fatigue that ultimately leads to an aircraft incident/accident. Finally, it is nearly impossible to comply with this regulation when evaluations "*…must be completed before the flight crewmember begins or continues an FDP*" for operations conducted at remote locations. The FAA should acknowledge these practicalities and treat compliance with the provisions of §§117.5(a), (b), (c) and (f) as providing sufficient assurance that each pilot is "fit for duty." It is nearly impossible to calculate a cost for compliance with proposed §117.5(g) as presently written. UPS will supply a supplemental cost analysis for this program once the elements of the program are clearly understood.

iv. §117.7 Fatigue Risk Management System

Certificate holders are being asked to bear significant costs and disruptions to their operations if FAR part 117 is implemented prior to the FRMS approval process. The FAA must provide clear detail, prior to any final rule implementation, on approval processes, FRMS-permissible operations, FRMS maintenance, and daily operational use. This direction is necessary so as to prevent a valid safety-enhancing, fatigue-mitigating program from degenerating into a collective bargaining negotiation. UPS strongly recommends that the FRMS approval process be available for at least 12-months prior to the implementation of any final rule. Moreover, certificate holders who currently have fatigue mitigation strategies in place should be allowed to transition to an FRMS directly, with sufficient time permitted to do so. The FAA has provided scant detail as to how the FRMS process is to be accomplished. Lacking this information, UPS cannot provide a meaningful cost estimate with respect to this alternative.

v. §117.9 Schedule Reliability

UPS has serious concerns with this section. First, the proposed requirements are completely unrealistic. Schedule reliability is driven by factors beyond our control. For instance, the consistent FAA/ATC ground stops at EWR is a problem only the FAA can solve, and those issues should be solved before the FAA penalizes certificate holders. In order to comply with this regulation, significant block hours would be added to "pad the schedule," which will significantly drive up costs with no associated safety benefits. Further, artificially padding flight times will impact traffic flow at slot-controlled and high density airports. Arriving 45 minutes early because of an artificial schedule required to comply with this section will disrupt airport operations.

Second, the FAA is directly and inappropriately interfering with a labor-management issue, to wit, permitting certificate holders to reschedule crewmembers for flight duty within the tolerances of regulations and applicable collective bargaining agreements. Flight safety is not implicated if the maximum FDP limits are not exceeded and, therefore, certificate holders should not have to report occurrences of this nature as a reliability infraction.

Third, this regulation fails to consider low frequency operations. The regulation should contain a defined look-back provision to evaluate overall trends and averages. For example, the regulation should make clear that a one time excedence on a route flown two times per year should not require a schedule change.

Fourth, the time table for schedule adjustments is simply not practical. UPS suggests that required schedule changes occur twice per year, concurrent with the seasonal winds adjustment, which is a much more realistic solution for scheduled carriers. FAA must be mindful that schedule changes may also directly interfere with airport slot times, which could put carriers in a position of compromising their network by losing valuable slots because of this arbitrary regulation.

Fifth, there is no validated fatigue science justifying this section, and it presents a very real risk that crew fatigue will actually increase due to this rule. In order to comply with the schedule reliability standards, certificate holders will add more time to each scheduled leg. The net affect will be more “padded” time spent on the ground during multi-segment FDPs, with a corresponding reduction in the amount of restorative layover rest.

In sum, the concept behind this regulation envisioned only one business model—domestic scheduled operations. For others, this regulation is illogical and will dramatically affect U.S. carrier competitiveness in global markets from a cost and operational flexibility perspective. Foreign carriers not subject to these requirements will have a strong competitive advantage. The increase in operating costs necessary for compliance with this regulation, which has no scientifically validated evidence demonstrating its necessity, will necessarily result in the loss of long-term, well-paying U.S.-based jobs.

vi. §117.11 Fatigue Education and Training Program

Rather than the Administrator identifying changes to current training programs, UPS recommends that the training requirements stream from the AQP and FRMS processes for carriers with those approvals in place. The FAA, in drafting this regulation, has ignored the move towards AQP.

vii. §117.13 Flight Time Limitations

The FAA has taken the most restrictive global standards, CAP-371, and made them even more restrictive for U.S. carriers, which will severely impact global U.S. air carrier competitiveness. This decision will likely lead to the erosion of U.S. air carrier presence in markets subject to foreign competition. Further, industry acquiescence in supporting the FDP concept was predicated on the removal of flight time restrictions. Industry ARC members strongly opposed the inclusion of flight time limits in any regulatory proposal containing FDP limits. The FAA should not act as the bargaining agent for the labor coalition.

Moreover, the proposed regulatory scheme will be cumbersome to apply in actual operations. Every pilot’s schedule will need to be recalculated upon the completion of each

FDP. The originally published schedule may be completely unreliable. For example, an un-augmented crew may be scheduled to operate an out-and-back flight to a foreign destination where no reserve pilots are available. The outbound flight may be delayed due to enroute weather or ATC delays, necessitating a later report time the next day for the return trip. If the crew's report time for the scheduled 9.5 hour return flight slips from the scheduled 1259 HBT report to 1303, the crew is no longer legal to conduct this operation. The aircraft and crew are now stranded. This instability will negatively impact system integrity and customer service. With no opportunity to adjust flight times for unforeseen circumstances, US carriers will have a significantly reduced ability to recover from the inevitable system disruptions since the "good to show, good to go" provisions of the current regulations will no longer apply. The FAA has no scientific data supporting the need for both a flight time requirement and a flight duty period requirement. FAA should select one measure or the other but not both; and it must provide the flexibility to exceed flight time limits, when necessary, if FAA continues to insist on retaining daily flight time limits.

viii. §117.15 Flight Duty Period: Un-augmented Operations

UPS's objections to this section are similar to those mentioned in the preceding paragraph. Certificate holders will need to conduct daily legality reassessments based on report time and acclimation (intended or not). The ability to operate the day's scheduled activity cannot be determined until completion of the prior day's FDPs.

UPS also objects to the arbitrary one-time limit on duty extensions longer than 30 minutes in any consecutive 168-hour period, especially as it will be determined by reference to scheduled and not actual periods worked. Consider the following scenario: A pilot is scheduled for a one day pairing on Monday morning at 1000 local consisting of a four-hour flight duty period with 2 segments. The second segment encounters an ATC delay, and the pilot's FDP is extended 1.5 hours to accommodate the delay. The pilot completes the one day pairing and enjoys the next three days off duty. The pilot then reports on Friday for the same trip pairing. The crew encounters a maintenance problem on the return segment, which takes two hours to repair. Since this pilot has already used his FDP extension, this flight now must be canceled because no reserve pilot is available at the outstation. This is an absurd result. Despite the fact that the pilot could legally be scheduled for 26 hours of FDP duty, which can be extended to 28 hours with the FDP extension, this flight would cancel, at significant cost to UPS and its customers, even though the pilot was scheduled for only eight hours of FDP duty and actually performed only 11.5 hours of FDP duty for the four day period.

Further, permitting only one extension is not feasible, especially when considering that significant "unforeseen operational circumstances" typically require more than 24-hours to return a disrupted air network to a normal state. UPS suggests the appropriate way to handle these extensions is to link them solely to the maximum FDP values of tables B and C and to mandate additional rest equivalent to the length of the preceding FDP if the table limits are exceeded. Moreover, the certificate holder should have the ability to utilize the extension without specific pilot-in-command ("PIC") concurrence. Since the PIC is obligated to report any condition of fatigue, the provision requiring PIC concurrence is not necessary for flight safety and will only complicate the certificate holder's ability to return a disrupted system back to a more normal state. Also, the need to contact the crew to receive their consent to utilize an extension presents a catch-22. The certificate holder needs to contact the crew to ask for the extension, but it cannot do so when the crew is in a rest period. Thus, the certificate holder cannot plan to use the extension when it could be critically necessary.

UPS also objects to the concept of acclimation as reflected in the proposed regulation. Under the proposed regulation, unacclimated flight crew members will be reporting for work based on their body clock at their home base. On the surface, this makes sense. However, for a U.S. based cargo express operation, it means that flightcrew members who report for work in the middle of the night (local time) on the other side of the world may be scheduled for the longest possible FDP. Additionally, flight crew members, mid-pairing, will change unexpectedly from acclimated to un-acclimated based on actual operations. While additional reserves can support this scenario in the flight crew member's domicile, it is not feasible to place reserves for these contingencies at every operating gateway. Finally, UPS strongly opposes having FDPs with nine-hour maximum limits. UPS's comments with respect to FDP limits can be found in section 5c, *supra*.[60]

ix. §117.17 Flight Duty Period: Split Duty

UPS strongly objects to this section. The FAA presents no rationale for selecting four hours as the minimum time required in suitable accommodations in order for certificate holders to take advantage of this provision. The rule also creates a major inconsistency in the treatment of sleep opportunity credit favoring rest in an aircraft over rest in a suitable accommodation—a counter-intuitive approach given that a ground facility is more conducive to sleep than an airplane. A 90-minute rest opportunity for a relief officer on an augmented flight in an aircraft with a Class I rest facility permits five additional hours of operation versus an un-augmented flight (based on a 0001 report). Split duty credit in a suitable ground accommodation, on the other hand, does not receive <u>any</u> credit until the crew receives at least a four-hour sleep

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[60] CAA, NACA and RAA industry representatives strongly opposed the 9 hour limits suggested by some industry representatives. Therefore, the FAA misrepresented an industry position when they indicated in the preamble that table A (2) "generally represented the carrier's position." The carriers did not generally or otherwise endorse any proposal at the conclusion of the ARC.

opportunity, and the credit, if provided, yields only two hours of additional FDP. Further, the FDP may be extended to a maximum of only 12 hours, whereas an augmented crew can be scheduled up to 14-16 hours, depending on report time. The disparity is even more illogical given that at a ground facility, all flight crew members receive the same sleep opportunity, whereas while on board, only one pilot can sleep at a time.

Moreover, since split duty credit is calculated dynamically (based on actual time behind the door), it is very difficult to build a schedule that can rely on this credit. The FDP extension is most likely needed during disrupted operations involving a weather event, which is probably when the likelihood of having four actual hours "behind the door" is least likely. Plus, the FAA does not regulate personal behavior. The regulation merely provides that a four-hour rest opportunity is provided; it does not require any actual sleep. Thus, a UPS pilot that receives an actual 3-hour nap in a suitable accommodation receives no credit, but a pilot that obtains zero sleep during a 4-hour period can have his or her duty day extended. Ironically, as drafted, in order to preserve the split duty credit when a flight arrives late into the sort facility, the certificate holder would have to delay the outbound flight, which would ultimately extend the FDP and delay the start of a legal rest period following a long night of duty. This would adversely affect pilot fatigue and is counter-safety. Further comments on this provision can be found in section 5, *supra*.

UPS recommends that the FAA not restrict consecutive nighttime operations. Should the FAA choose to restrict consecutive nighttime operations, it should allow unaugmented crews the ability to operate to table C FDP values that are associated with Class 1 rest facilities, so long as they have received a sleep opportunity in a ground based facility that satisfies section 117.19(c)(1).

x. §117.19 Flight Duty Period: Augmented Flightcrew

This section does not provide the flexibility needed to operate a 24-hour global operation. The last segment of an augmented flight operation requires the landing pilot to have two hours of rest; however, no provision is made for unforeseen circumstances, such as flight diversions. Therefore, a diverted flight cannot utilize the augmented FDP limits in Table C simply to operate from a diversion airport to destination. Further, the regulation does not account for customer demands in certain charter scenarios. A customer may require a short final segment. UPS would like to offer an alternative solution that would require that the inflight rest opportunities of §117.19(c) be available within the last eight hours of the FDP.

Thus, four person augmented operations with a class one rest facility should provide a 16-hour FDP regardless of report time. Doing so would allow U.S.-based certificate holders to compete globally without an FRMS. Moreover, close examination of maximum FDP limits in 4-pilot augmented operations is counter-intuitive. A crewmember reporting at 0701 has more available FDP than a crewmember reporting at 2359. The crew reporting just before midnight has much less "time since awakening" fatigue during the onset of the WOCL than the crew that reported almost 24-hours ago during the previous WOCL.

With respect to UPS's position regarding limits on permissible FDP extensions, please see our comments in section 2e, *supra*.

UPS objects to the FAA's introduction of the concept of approved on-board rest facilities. Clearly, the FAA again failed to consider business models different from that of the typical passenger airline. This rest facility concept has significant business ramifications for certificate holders who do not operate aircraft with passenger seats. Due to the configuration of UPS's Boeing 767 fleet (approximately 18% of our total fleet), we have no method of obtaining a qualifying on-board rest facility. To our knowledge, Boeing Co. has no viable solution. UPS has safely operated the B767 on augmented routes for 14 years. The FAA presents no scientific justification for suddenly declaring these operations prohibited. UPS will have no choice but to remove these aircraft from service on segments greater than those permitted by the Table A limits, which places UPS at a significant competitive disadvantage. Moreover, the entire rest facility scheme is based on merely one study conducted by the Dutch government using a passenger airline paradigm (the “TNO” study). It is inappropriate for FAA to drastically impact U.S. air carrier operations without valid, scientific data indicating that such operations are unsafe, especially when you consider that none of the fatigue related accidents presented by the FAA in the regulatory impact analysis involved augmented flights.

xi. §117.21 Reserve Status[61]

Many of the provisions of this section override or replace collectively bargained work rules. First, permitting “shifts” within a reserve availability period is a standard practice that carriers have engaged in for years without compromising crew alertness. Implementing this regulation would substantially limit UPS’s ability to utilize a fully rested reserve resource to cover unexpected operations. The other prescriptive requirements contained in this proposal are self-governing and ensure well-rested pilots. The “shift” concept is unnecessary and overly restrictive. Once again, FAA provides no scientific evidence to justify this regulation.

Second, as drafted, §117.21(c)(4)(ii) is overly restrictive. This section disallows certificate holders from utilizing reserve pilots for their intended purpose—maintaining system integrity in the event of unforeseen operational delays. For example, suppose a short call reserve begins his reserve availability period at 0800. At 1000, crew schedule notifies the pilot of a flight assignment with a 1200 report time. The assigned flight is scheduled for 2 hours. Upon

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[61] Reserve rules were one of only two areas on which the ARC reached consensus, but the FAA has elected to disregard those ARC recommendations for a scheme of its own making. This regulatory proposal does not reflect the ARC’s consensus with regards to reserve status.

reaching destination, crew schedule needs to reassign this crewmember to another two-hour segment. As presently drafted, §117.21(c)(4)(ii) limits the flightcrew member's FDP to what he/she was originally scheduled to do for that FDP. This is illogical as that same reserve pilot could have originally been assigned to operate a 10-hour segment. This section artificially and arbitrarily restricts certificate holders from fully utilizing reserve pilot resources for their intended purposes (non-routine operations), which drives up operational costs and expenses, while significantly hamstringing the operator's ability to recover from a disrupted network. The FAA provides no scientific justification for this restriction (and there was no discussion of this limitation at the ARC proceedings).

Third, §117.21(d)(3) is overly restrictive. Line holding pilots may be scheduled for duty during the WOCL with 9 hours of rest; this same limitation should apply to pilots on reserve. The FAA again fails to provide any scientific justification for treating pilots on reserve differently from lineholders.

Finally, counting short call reserve as duty demonstrates the FAA's role as bargaining agent for organized labor. The FAA provides no scientific data that merely sitting at home with the simple requirement of having to potentially answer a phone call is a fatigue-inducing event. Also, reserve pilots at UPS, via their collective bargaining agreement, have the ability to request additional flying duties on scheduled days off. This too significantly restricts our ability to utilize our reserve pilots when needed, thus UPS will be forced to hire additional crewmembers and incur the associated costs. The FAA has failed to account for these types of costs in its cost / benefit analysis. For further comments on this section, please see section 4, *supra*.

xii. §117.23 Cumulative Duty Limitations

UPS objects to the lack of permissible duty period extensions for events beyond the certificate holder's control. The regulation provides no safety valve should a federally required event occur at or near the expiration of a crewmember's duty period limit (e.g., random drug and/or alcohol testing, meeting with FAA or NTSB officials following an incident or accident, etc.). The regulation should provide a means by which duty period extensions are permissible for federally required duties beyond the certificate holder's control.

UPS also objects to the definition of "other administrative duties" since it can greatly impact the future of certificate holders utilizing line-qualified and current management pilots. UPS believes maintaining flight-qualified management personnel is a fundamentally important aspect of our excellent safety record, and we strongly believe that including "other administrative duties" in the accumulative duty limits will have a profound negative affect on the future of flight safety. In general, the variable nature of "other administrative duties," whether it be for management or line pilots, will be nearly impossible to manage. It is conceivable that, as presently defined, flight crewmembers will have the ability to make themselves illegal for a future FDP. These activities may be completely invisible to the certificate holder until just prior to the start of an FDP. This presents significant operational impediments and could negatively affect schedule reliability and service quality.

Also, the FAA has determined that cumulative duty limits can be safely established to 75 duty hours in any 168 consecutive hours and 215 hours duty in any 672 consecutive hours. Thus, UPS suggests that these be the only applicable duty limits. The FAA should not attempt to regulate items that are traditionally addressed via the collective bargaining (e.g., first class seats for deadhead transportation). The FAA presents no scientific validation for restricting maximum duty period limits unless a crewmember is on short call reserve or deadheads in a first class seat.

Finally, in the interest of providing fatigue mitigation for flight crew members who will be acting as operating crewmembers, UPS suggests that in §§117.23(b), (c), and (d), the word “assignment” be replaced with “Flight Duty Period.”

xiii. §117.25 Rest Period

UPS has several objections to §117.25. The proposed “three physiological night’s rest” requirement contained in §117.25(b)(1) is illogical. The FAA provides no scientific justification for mandating three physiological night’s rest upon return to home base. Rest at home base should be treated the same as rest in layover cities. Off-duty time between pairings is traditionally, and correctly, addressed via the collective bargaining process.

Further, having rest periods commence based on hotel check-in time will require crew scheduling software updates in order to capture more data points than are currently monitored (e.g., hotel check-in time). In addition, a certificate holder will not know if a crewmember is legal for the next day’s FDP until actual hotel check-in time is known. The cost of dropped trips, service failures, and lost customer base was simply not factored into the FAA’s cost analysis. It is also possible that hotel arrival time could be manipulated by a crewmember in such a manner so as to force a report time for the following FDP that would be in a time window (per Tables A and B) that has less permitted flight time and FDP available. This could force the certificate holder to cancel certain trips. Moreover, §117.25(d) is completely unmanageable. This section essentially requires a nine hour “lookback” beginning when the crewmember leaves home or a suitable accommodation. Airline operators have no means by which they can ensure that crewmembers live within 30 minutes of the airport. Certificate holders should be required to do no more than provide a legal rest period; it is incumbent upon *crew members* to properly utilize those rest periods.[62]

More significantly, section 117.25(d) could be interpreted as effectively precluding any type of commuting at all within the nine hour period prior to reporting for the first leg of a crew pairing in an FDP. As the proposed regulation also mandates that the crew reach a hotel or other suitable accommodation before the nine hour rest period can begin, the injury from this one-two punch cannot be overstated. This will affect the vast majority of flightcrew members at all airlines, since few live in the immediate vicinity of their domicile.

With respect to §117.25(e), certificate holders should have the ability to utilize the reduced rest provisions without specific PIC concurrence. Since the PIC is obligated to report any condition of fatigue, requiring PIC concurrence is not necessary for flight safety and will only complicate the certificate holder's ability to return a disrupted system back to a more normal state. This delay in a certificate holder's ability to utilize the reduced rest provisions of this part will have an adverse affect on safety by increasing crew fatigue. This additional safety risk is the result of the fact that PIC approval is required before we can plan to use the reduced rest provision in order to restore the network following a major disruptive event. Moreover, asking the PIC for an extension during his/her rest period places the certificate holder in an untenable position: Do you interrupt the rest period to seek approval, or do you risk receiving an

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[62] It is possible that FAA intended for this provision to apply only to layover rest periods and not off-duty periods. However, as drafted, the nine hour lookback applies to all duty periods, including the first duty period of any assignment. This provision essentially forces crewmembers to live within 30 minutes of their domicile. We have no interest in, nor do we have the capability to, monitor our crewmembers' whereabouts while they are off-duty. Further, this section presents major problems with the crewmember bidding process. Since we do not know who will be awarded any particular bid line and where that pilot may be on his/her days off, we cannot ensure a nine hour lookback prior to the first scheduled duty period. It must solely be a crewmember's responsibility to ensure adequate rest prior to beginning a series of flight duty periods.

unfavorable answer at the beginning of the next FDP? Certificate holders need more scheduling certainty in order to maintain system integrity.

Limiting the reduced rest opportunity to one occurrence during each 168 consecutive hour period is not feasible, especially when most significant "unforeseen operational circumstances" typically require more than 24-hours to return the air network to a normal state. UPS suggests that multiple reductions be permitted, but PIC approval be required for any reduced rest period beyond the first one.

xiv. §117.27 Consecutive Nighttime Operations

UPS's comments with respect to this section can be found in section 5, *supra*.

xv. §117.29 Deadhead Transportation

UPS suggests that this definition be revised to include aircraft that do not have passenger cabins to include flight deck occupants and other additional crewmembers. It should also be specific to deadhead transportation "at the direction of the certificate holder." Flight crewmembers frequently travel to or from their FDP via a different routing than that scheduled by the certificate holder.

xvi. §117.31 Operations Into Unsafe Areas

The exception for operations into "unsafe" areas is subject to so many different interpretations, no airline could be reasonably expected to avail itself of it. We question the appropriateness of fostering a public perception that the FAA is allowing certificate holders to conduct operations that are defined by the FAA as "unsafe." In any event, UPS suggests that the FAA rename this section "Enhanced Security Consideration Area: Prescriptive Exemption."

8. ADOPTION OF THE PROPOSED RULE WOULD VIOLATE THE ADMINISTRATIVE PROCEDURE ACT AND OTHER LAWS.

UPS agrees with and adopts all of the legal objections raised in the comments submitted by the ATA and CAA. In addition, the discussion immediately below focuses on only the most egregious legal flaws in the proposed regulation. In particular, as explained, the proposed regulation is incompatible with the APA, violates the Airline Safety and Federal Aviation Administration Extension Act of 2010, violates the Information Quality Act, and violates the Fifth Amendment's Due Process Clause of the U.S. Constitution.

a. The Proposed Rule Is Arbitrary And Capricious, And Unsupported By Substantial Evidence.

Under the APA, a court must "hold unlawful and set aside agency action" that is "arbitrary, capricious, an abuse of discretion" or "unsupported by substantial evidence." 5 U.S.C. § 706(2)(A), (E). These standards require an agency to "examine the relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'" *NetCoalition v. S.E.C.*, 615 F.3d 525, 532 (D.C. Cir. 2010) (quoting *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983). In addition, an agency decision is arbitrary and capricious if the agency "entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Cablevision Sys. Corp. v. F.C.C.*, 597 F.3d 1306, 1310 (D.C. Cir. 2010) (internal quotation marks omitted). Below is a non-exhaustive summary of the numerous ways that the FAA did not meet the APA standards:

First, the one-size-fits-all approach, without accounting for the substantial differences between cargo and passenger carriers, is arbitrary and capricious, and unsupported by substantial evidence. "Where an agency applies different standards to similarly situated entities and fails to support this disparate treatment with a reasoned explanation and substantial evidence in the record, its action is arbitrary and capricious and cannot be upheld." *Burlington N. & Santa Fe Ry. Co. v. Surface Transp. Bd.*, 403 F.3d 771, 777 (D.C. Cir. 2005). Likewise, where an agency applies the same standard to differently situated entities, without a reasoned explanation and evidentiary support, it violates the APA. For example, in Color Pigments Manufacturers Association, Inc. v. OSHA, 16 F.3d 1157 (11th Cir. 1994), the court reversed an agency order that failed to account for differences between categories of regulated entities, or differences in sectors of the industry. The order would have required that cadmium "pigments" be included in the standard governing workplace exposure to cadmium. *Id*. at 1159. The dry color formulator industry argued that OSHA had failed to give sufficient attention to the unique concerns of that industry, and erred in concluding that the cadmium pigment standard "was technologically and economically feasible for" dry color formulators. *Id*. at 1161. The court agreed, holding that in "its grouping of the dry color formulator industry with other users of cadmium pigments and its failure to study any particular dry color formulators whatsoever[,] . . . OSHA proceeded generically rather than making the requisite specific findings for this identifiable industry segment." *Id*. The court therefore reversed OSHA's findings and remanded "for a determination of the technological and economic feasibility of the standard as it applies specifically to the dry color formulator industry." *Id*. at 1159. While this case was decided under OSHA's governing statute, 16 F.3d at 1160, the analysis is equally valid in the APA context at issue here.

The FAA's only explanation for equal treatment of cargo and passenger carriers is that "there are no physiological differences between pilots who fly cargo planes and pilots who fly passenger planes." However, the FAA's own analysis recognizes that the issue is not simply physiology, but a weighing of costs and benefits. The FAA presents no rationale for imposing the same regulations on two very different industries, particularly where, as here, the costs and benefits to each industry are dramatically different. Nor does the FAA even attempt to explain how it can promulgate the current rule consistent with its recent abandonment of the similar 1995 proposal on the ground that, after 15 years of study, that proposal raised too many complex issues that the FAA was unable to resolve.

Furthermore, the FAA's one-size-fits-all policy is a striking departure from the existing rules, which do recognize such differences. When an agency makes such a change in policy and "its prior policy has engendered serious reliance interests," then those interests "must be taken into account," and "[i]t would be arbitrary or capricious to ignore such matters." *F.C.C. v. Fox Television Stations, Inc.*, 129 S.Ct. 1800, 1811 (2009). Here, there are enormous reliance interests, as discussed above, regarding the difficulties in changing schedules, aircrafts, and collective bargaining agreements. The FAA's failure to address these interests also renders the proposed regulations arbitrary and capricious.

Second, the FAA's erroneous cost-benefit analysis renders the proposed regulations arbitrary and capricious, and unsupported by substantial evidence. *See, e.g.*, *Public Citizen v. Federal Motor Carrier Safety Admin.*, 374 F.3d 1209, 1219 (D.C. Cir. 2004) ("In light of this dubious assumption, the agency's cost-benefit analysis is questionable, and, as a consequence, so is its justification for increasing maximum driving time from ten to eleven hours."). The FAA's analysis was flawed in numerous respects, as the FAA failed to account for many costs, understated other costs, and overstated benefits. For instance, the FAA did not consider costs of compliance to cargo carriers like UPS, including, among other things, the revenue losses and long-term economic harm to UPS from impaired seventh-freedom commercial rights in international markets.

In any event, even if the cost-benefit analysis were accurate, the FAA's cost-benefit analysis fails to support the regulations. The FAA does not explain why estimated benefits of $659 million justify costs of $1.25 billion. Indeed, a negative effect of almost $600 million can only be considered a reason to reject the proposed regulations. Yet, the FAA purports to use the cost-benefit analysis as a main justification for the regulations. And the FAA certainly provides no reason why the regulations should be adopted despite the enormous, negative economic consequences.

Moreover, the FAA does not perform any cost-benefit analysis to support the augmentation and rest facility regulations, instead simply referencing ARC presentations. But these ARC presentations were not included in the rulemaking docket and so could not be the subject of comment. Thus, it would be arbitrary and capricious for the FAA to rely on these reports in support of the augmentation and rest facility regulations. *See, e.g., Owner-Operator Indep. Drivers Ass'n, Inc. v. FMCSA*, 494 F.3d 188, 202-03 (D.C. Cir. 2007) (vacating agency rule limiting the hours of commercial truckers due to the agency's failure to disclose documents supporting the methodology that the agency used to create the rule). And if the FAA did not rely on these reports, then the augmentation and rest facility regulations are not supported by substantial evidence. *See, e.g., City of Naples Airport Auth. v. F.A.A.*, 409 F.3d 431, 436 (D.C. Cir. 2005) (holding that "the FAA's conclusion…is not supported by substantial evidence" where the FAA "did not…collect information on the subject.").

Third, it is established law that an agency's "failure to provide an opportunity for comment on the model's methodology . . . constitute[s] a violation of the APA's note-and-comment requirements." *Ower-Operator Ind. Drivers Assoc. v. Public Citizen,* 494 F.3d 188, 201 (D.C. Cir. 2007) (*Public Citizen II*). As the D.C. Circuit has squarely held, "[a]n agency commits serious procedural error when it fails to reveal portions of the technical basis for a proposed rule in time to allow for meaningful commentary." *Id.* at 199. Here, however, notwithstanding specific requests for information from the CAA and others, the FAA refused to divulge key portions of the underlying basis of its cost-benefit analysis. Indeed, the FAA candidly admits that the limits on FDP hours where there are multiple segments are based not on science—it concedes the issue is not addressed by sleep studies—but rather on the undisclosed anecdotes "among the ARC members and FAA staff previously employed as pilots…that multiple take-offs and landings are more fatiguing." *See* 75 Fed. Reg. 55,860. These anecdotes, whether or not by design, are immune from scrutiny.

Fourth, the proposed regulations are arbitrary and capricious, and unsupported by substantial evidence because they do not address the core causes of pilot fatigue and, indeed, adopts requirements that will undermine safety. In particular, the regulations are not grounded in science. While the FAA conceded that fatigue science is not well developed in the aviation context, it ignored this uncertainty in formulating the regulations. It likewise ignored the numerous factors, like commuting, that do cause pilot fatigue, and thus adopted a rule that is unlikely to redress the problem the FAA purports to be fixing. To the contrary, the limitation on consecutive nighttime operations will actually degrade flight safety by creating more first night operations. The FAA admits that first-night operations are the most dangerous operations in consecutive nighttime flights, but provides no analysis as to the scope of this problem, and no rationale for why the regulations were created in a manner that engenders such a significant problem.

Fifth, the FAA failed to consider actual alternatives in any meaningful way when formulating the regulations. "It is well established that an agency has a duty to consider reasonable alternatives to its chosen policy and to give a reasoned explanation for its rejection of such alternatives." *Farmers Union Cent. Exchange, Inc. v. FERC*, 734 F.2d 1486, 1511 (D.C. Cir. 1984). Here, the FAA failed to fully consider the CAA proposal, performance-based alternatives, a regulation modeled on existing regulations, or the changes to the proposed regulation necessary to even minimally account for the differences between all-cargo and passenger airlines. Indeed, the FAA, in its rejection of an extension of the comment period, expressly relied on the idea that industry members had an opportunity for input to the ARC. However, the ARC cannot substitute for the obligation that the APA imposes on the FAA to engage in reasoned clarification. In any event, the ARC did not seriously consider any alternative proposals.

Sixth, the APA requires the FAA to give interested parties "an opportunity to participate in the rule making through submission of written data, views, or arguments." 5 U.S.C. § 553(c) (2007). Accordingly, the failure to provide a "meaningful" opportunity to comment on "critical factual materials" supporting a proposed rule constitutes "serious procedural error." *Owner-Operator Ind. Drivers' Assoc.*, 494 F.3d at 188. Here, the FAA violated this principle by refusing to grant numerous reasonable requests for extensions of time to provide comments on the NPRM and by not providing interested parties with an opportunity to provide meaningful comment on whatever analysis of the commuting issue that the National Research Council ends up publishing—an analysis that the NRC will not even begin until after the due date for comments on the NPRM.

Seventh, for the reasons stated in *supra* Part 7 and the appendices, each of the specific regulations discussed therein are arbitrary and capricious.

Finally, the FRMS is insufficient to save the regulations from being arbitrary and capricious. To begin with, the FRMS process is currently too vague and undefined to determine whether it will actually allow for a more reasonable alternative to the new regulations. Moreover, in answering questions regarding the FRMS process, the FAA has suggested that there would only be exemptions for specific routes, not for carriers, which would make the FRMS wholly inadequate to address the problems discussed in this Comment.

b. The FAA's Lack Of Scientific Support For Its Proposed Rule Violates The Airline Safety And Federal Aviation Administration Extension Act Of 2010.

The Airline Safety and Federal Aviation Administration Extension Act of 2010 ("Airline Safety Act") instructed the FAA to create regulations concerning flightcrew duty and rest requirements. Specifically, the Airline Safety Act states: "[T]he Administrator of the Federal Aviation Administration shall issue regulations, based on the best available scientific information, to specify limitations on the hours of flight and duty time allowed for pilots to address problems relating to pilot fatigue." P.L. 111-216 § 212. Thus, under the statute, the proposed regulations at issue here must be "based on the best available scientific information." *Id.*.

Courts have strictly enforced a statutory requirement that an agency use the best available science or data. The Supreme Court has held that "[t]he obvious purpose of the requirement that each agency 'use the best scientific and commercial data available' is to ensure that the [statute] not be implemented haphazardly, on the basis of speculation or surmise." *Bennett v. Spear*, 520 U.S. 154, 176 (1997). And where an agency's methodology "not only failed to conform with the scientific peer reviews, but also with the position previously taken by the [agency]," and where its model "suffered from uncertainty and potential bias," then the agency's action "is not supported by the best available science." *Trout Unlimited v. Lohn*, 645 F. Supp. 2d 929, 951, 954 (D. Or. 2007). Here, for the reasons discussed above, the FAA's cost-benefit analysis employs a fatally flawed methodology that violates every principle of sound scientific analysis. In addition, the FAA's scientific evidence is concededly uncertain and ignores the best information available, which would have come from a properly conducted "effectiveness" study using formal statistics as opposed to the FAA's flawed approach. Accordingly, the proposed rule violates the statutory requirement.

c. The Proposed Regulation Violates the Information Quality Act.

The proposed rule fails to meet the standards for information and data required by the Information Quality Act and the guidelines applying that Act. The Information Quality Act directs the Office of Management and Budget ("OMB") to issue guidelines that "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies." 44 U.S.C. § 3516(a) (2007). The OMB guidelines direct federal agencies to ensure and establish information "[q]uality at levels appropriate to the nature and timeliness of the information to be disseminated," and to "adopt specific standards of quality that are appropriate for the various categories of information they disseminate." 67 Fed. Reg. 8458-59. The guidelines state that if an agency is responsible for disseminating "influential scientific, financial, or statistical information"—meaning that the "agency can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on important public policies or important private sector decisions"—then the agency's guidelines "shall include a high degree of transparency about data and methods to facilitate the reproducibility of such information by qualified third parties." *Id.* at 8460. The OMB regulations encompass "information" broadly, meaning "any communication or representation of knowledge such as facts or data, in any medium or form." *Id.*

The Department of Transportation guidelines under the Information Quality Act apply to the FAA and "to information in rulemakings just as they do to other information." *See* Guidelines at 5, 12. These guidelines also make clear that their scope includes "docketed material, if and when the Department uses and disseminates the material." *Id.* at 4. The operative term is "quality" which, according to the Guidelines, includes utility, objectivity, and integrity. *Id*. at 15. The Guidelines define utility as the "usefulness" of the information; objectivity as the extent to which the information is "accurate, clear, complete, and unbiased" as to substance and presentation; and, integrity as the extent to which the information is "protected from unauthorized access, corruption, or revision." *Id*. at 15-17.

The FAA's analyses in support of this rule fail to meet these standards. In addition, also for reasons explained, the FAA's analysis of sleep science is flawed, and for these reasons as well, the regulations have little or no scientific basis. Indeed, the FAA also ignores sleep science that contradicts its position, especially the evidence that first night duty periods are the most difficult. As noted above, the FAA failed to adhere to the DOT's *Guide to Good Statistical Practice in the Transportation Field*. Accordingly, the information and data the FAA used in analyzing sleep and fatigue in the aviation context and otherwise promulgating this rule is insufficient under the Information Quality Act. For the reasons explained above, the FAA's cost-benefit analysis cannot possibly conform with the Information Quality Act. Furthermore, the principles articulated in the IQA are reinforced by OMB Bulletin M-05-03. As the Bulletin provides, agencies disseminating influential scientific information must:

- Subject the scientific information to peer review. *Id.* at 37.
- Select peer reviewers based on expertise, experience and skills, including specialists from multiple disciplines, as necessary. *Id.*

- Ensure that reviewers' conflicts of interest are properly examined. *Id.* at 37-38.

- Ensure that reviewers have not participated in development of the work product. *Id.* at 38.

- Instruct reviewers to prepare a report, disseminate the report along with all materials related to the peer review, and disclose the names of the reviewers and their organizational affiliations. *Id.* at 38.

- Choose a peer review mechanism that is adequate, giving due consideration to the novelty and complexity of the science to be reviewed, the relevance of the information to decision making, the extent of prior peer reviews, and the expected benefits and costs of additional review. *Id.* at 22.

For highly influential scientific information—*i.e.*, where there is a $500 million annual impact or the scientific assessments are "novel, controversial, or precedent-setting," *id.* at 23, the agencies must also:

- Bar participation of scientists employed by the sponsoring agency unless the reviewer is employed only for the purpose of conducting the peer review. *Id.* at 40.

- Provide the reviewers with sufficient information—including background information about key studies or models—to enable them to understand the data, analytic procedures, and assumptions used to support the key findings or conclusions of the draft assessment. *Id.*

- Make draft scientific assessments available for public comment whenever feasible and appropriate. *Id.*

- Include in the peer review report the charge to the reviewers and both the credentials and relevant experiences of each peer reviewer. *Id.* at 41.

- Prepare and disseminate a written response to the peer review report. *Id.*

Here, the requirements for highly influential scientific information are applicable, or, at a minimum, the requirements for influential scientific information. However, the FAA has failed to certify that it complied with OMB Bulletin M-05-03, as required under Section VII of the Bulletin, nor has it presented any basis for an exemption from the Bulletin's requirements.

Indeed, there is nothing in the record to suggest that the FAA has conducted any peer review, let alone that it satisfied the particular requirements set out above.

Accordingly, under the Information Quality Act and OMB Bulletin M-05-03, the FAA must withdraw the flawed reports and analyses upon which the proposed regulation rests. And since these reports are the basis for the proposed regulation, it necessarily follows that the proposed regulation is unsupported by substantial evidence under the Administrative Procedure Act. In addition, the FAA's failure to follow its own regulations implementing the Information Quality Act, and OMB Bulletin M-05-03, as well as the other rules governing the FAA's cost-benefit analysis discussed herein, independently renders the proposed rule arbitrary and capricious under the APA, and also violates UPS's Fifth Amendment Due Process rights, since an agency is obligated to follow its own internal rules of procedure. *See, e.g., Steenholdt v. F.A.A.*, 314 F.3d 633, 639 (D.C. Cir. 2003) ("The Accardi doctrine requires federal agencies to follow their own rules, even gratuitous procedural rules that limit otherwise discretionary actions."); *Int'l Fabricare Inst. v. E.P.A.*, 972 F.2d 384, 396 (D.C. Cir. 1992) ("If an agency action is based upon a defined procedure, even though generous beyond the requirements that bind such agency, that procedure must be scrupulously observed.") (internal quotation marks and citation omitted).

d. The Proposed Regulation's Impairment of Contracts Violates The Due Process Clause Of The U.S. Constitution.

The FAA's impairment of the collective bargaining agreement between UPS and the IPA violates the Due Process Clause of the Fifth Amendment. Although the Contracts Clause (U.S. Const., art. I, § 10, cl. 1) does not expressly apply to the federal government, similar principles apply under the Due Process Clause. "To prevail on a claim that federal economic legislation unconstitutionally impairs a private contractual right, the party complaining of unconstitutionality has the burden of demonstrating, first, that the statute alters contractual rights or obligations." *Nat'l R.R. Passenger Corp. v. Atchison, Topeka & Santa Fe Ry. Co.*, 470 U.S. 451, 472 (1985). Here, there is a substantial impairment of contractual rights because the regulation dramatically alters the detailed contractual relationship between UPS and the IPA. In particular, the regulation would have a significant effect on pilot pay and the bargained-for safety practices to prevent pilot fatigue.

Furthermore, there is no legitimate justification for the regulation's impairment of collective bargaining agreements. Where, as here, "the impairment is substantial, a court must look more closely at the legislation," and there is "a Fifth Amendment due process violation" if "the legislature has acted in an arbitrary and irrational way." *Id.*; *see also Energy Reserves Group, Inc. v. Kansas Power & Light Co.*, 459 U.S. 400, 412 (1983) (holding that the "inquiry is whether the adjustment of the rights and responsibilities of contracting parties is based upon reasonable conditions and is of a character appropriate to the public purpose justifying the legislation's adoption") (internal quotation marks and alterations omitted). Here, for the reasons discussed above, the regulation is arbitrary and irrational, particularly with respect to collective bargaining agreements. The FAA failed to consider the regulation's significant effect on these agreements, including whether the agreements would provide a better mechanism for preventing pilot fatigue than does the regulation.

9. CONCLUSION

The full cost of any government regulation is seldom known until it is implemented. The FAA is wiping the slate clean after 70 years of regulation of crew hours that have, on balance, worked well and that are well defined and interpreted. A wholesale change in flightcrew duty and rest limitations is not required to mitigate fatigue risk. What will replace a known and workable set of rules is an approach that has never been tested, was never fully vetted, and that has so many ambiguities about it that unintended consequences are inevitable.

For all the reasons discussed, the FAA should withdraw the proposed regulation, reissue a revised regulation addressing the myriad flaws discussed above, and provide a reasonable period of time for stakeholders to comment on that new proposed regulation.

APPENDICES

I. SUMMARY OF UPS'S AND UPSCO'S OPERATIONS

1. This summary accompanies UPS's comments submitted in response to the Federal Aviation Administration's ("FAA") Flightcrew Member Duty and Rest Requirements Notice of Proposed Rulemaking ("Rule" or "Proposal"), published in the Federal Register on September 14. 2010.

2. For purposes of this summary, "UPSCO" means the air carrier that operates under FAA certificate authority pursuant to Part 121 of the Federal Aviation Regulations. "UPS" means the corporation as a whole, United Parcel Service, Inc.

3. UPS's primary business is the time-definite delivery of packages and documents worldwide. The U.S. Domestic Package operation includes the time-definite delivery of letters, documents, and packages throughout the United States. UPS offers early morning delivery to more than 23,000 U.S. ZIP codes.

4. UPS employs more than 340,000 people in the United States. Additionally, over 68,000 employees are based outside of the United States. In 2009, UPS delivered an average of 15.1 million pieces per day worldwide. Total revenue in 2009 was $45.3 billion.

5. UPSCO operates the world's 9th largest airline with 217 aircraft in service and over 2,600 pilots.

6. UPSCO commenced air service in 1981. UPS has managed and operated its own airline since 1988.

7. UPSCO's cargo in a single fully loaded B747-400 aircraft can include as many as 18,000 packages. UPSCO's typical cargo often includes, among other things, critically needed medical supplies and pharmaceuticals, highly-perishable goods whose value can be completely destroyed by a flight delay or cancellation, and sophisticated, high-value industrial components used to operate critical infrastructure such as power stations and water treatment plants.

8. UPSCO's air cargo service encompasses three basic operations: (1) Next Day Air Service, (2) Second Day Air Service, and (3) International Service. As explained below, certain aspects of the proposed rule impose specific burdens on Next Day Air Service, which is our core domestic function. Other aspects of the rule will generally affect all three of UPSCO's basic operations.[63]

NEXT DAY AIR SERVICE

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[63] Additional information about UPS can be found in UPS's Form 10-K, available at http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9MzcyOTI0fENoaWxkSUQ9MzcwNDk4fFR5cGU9MQ==&t=1.

9. The core domestic function of the airline is providing next day air service, wherein we retrieve packages on one day for delivery the following morning. This is a primarily nighttime operation. Thus, UPSCO pilots are effectively "night shift" workers and, accordingly, adjust their lifestyles in the same manner as other professionals working "night shifts" (e.g., doctors, nurses, etc.). In UPSCO's experience, the best way to mitigate pilot fatigue in this context is to allow scheduled events to be completed for a given duty period and then add more rest should the flight duty period be extended beyond the limits. The proposed limit on consecutive nighttime operations will dramatically impact this valuable UPSCO service.

10. UPSCO airlines operates a network with one all-points hub in Louisville, Kentucky; five regional hubs in Hartford, CT, Ontario, CA, Philadelphia, PA, Rockford, IL, and Miami, FL; and operations at 96 domestic airports and 79 international airports.

11. UPS processes approximately 900,000 next-day air packages each night at our Worldport facility in Louisville, Kentucky. Total daily US air volume is 2.2 million packages and documents. UPS delivers packages earlier to more businesses and zip codes in the United States than our competitors.

12. UPS serves approximately 1.8 million pick-up customers and 6.1 million delivery customers daily worldwide To provide this service, UPS operates a fleet of over 95,000 vehicles. Additionally, UPS customers may drop off packages at any of our over 4,600 The UPS Store locations or over 40,000 UPS Drop Boxes.

13. To best serve our customers, we enable late drop off times. UPS establishes deadlines for customers to drop off packages, typically between 6:00 p.m. and 8:00 p.m., depending on the specific location. UPS then guarantees delivery of the packages the following morning with guaranteed early a.m. delivery by 8:30 a.m. and normal morning delivery by 10:30 a.m. To provide service within this tight timeframe, UPSCO must operate its airports, hubs, and aircraft with the highest level of precision, coordination, and efficiency.

14. After picking up packages, UPS's trucks carry them to local ground centers and from the ground centers to local airports. At airports, workers load packages onto aircraft. Each aircraft then transports its packages directly to an air hub or stops at one intermediate airport to pick up additional packages before continuing on to an air hub.

15. At the hub, the sort operation takes place. Workers unload all packages from the inbound aircraft, sort them, and load them onto the outbound delivery aircraft. The sort operation takes approximately 4 hours with staggered arrivals and departures aligned with required flight times for various regions of the U.S.

16. The aircraft performing pickup and delivery are essentially the same, with each aircraft positioned at the air hub during the sort operation until it is fully loaded

for its destination volume. The aircraft then flies back to at most two airports, where workers transfer the packages to trucks that carry them to a local ground center. At the ground centers, workers sort the packages again and load them onto smaller trucks for delivery to our customer's homes or businesses.

17. Airplanes depart local airports so as to arrive at a hub beginning at about 11:00 p.m. After the sort operations, aircraft begin leaving the hubs around 3:00 a.m. and arrive back at the local airports from which they started in time to meet the morning delivery deadlines. Departure times are staggered depending on the destination region and the time it takes to arrive in time for our service commitments.

18. This service operates five nights per week (Monday – Friday). Aircraft used in the domestic next day air operation typically sit idle on the weekends.

19. This schedule is necessary to allow our aircraft to arrive at destination in time to meet our Guaranteed Service Return delivery deadlines. Under this program, if the package is not delivered on-time, the customer's entire fee for package delivery is refunded. UPSCO carries cargo; unlike a passenger airline, the only people on UPSCO flights are crewmembers and other approved flightdeck jumpseat occupants. A typical UPS Airbus A300 operates with a crew of 2 pilots and can carry a typical load of about 12,000 packages. Thus, due to the GSR program, the direct costs to UPSCO for flight cancellations are significantly greater than flight cancellation costs absorbed by passenger air carriers.[64]

20. The timing of the sort operation is the result of an integrated network designed to provide specialized transportation and logistics services to UPS customers. UPS uses several different modes of transportation, including air, ground, and rail.

21. The schedules of all inbound and outbound movements are dependent upon each other. No mode of transportation is more vital than any other. The schedules of all of these movements are used as the basis to determine the optimum time frame in which to operate the air sorts.

22. Due to the integration and synchronization of all of these movements, any change or shift in the air movement schedules and/or the air sort operating schedules impacts the entire UPS network for all locations and service offerings. Thus, changes in scheduled operating times for the UPSCO air sorts are not feasible.

23. To accommodate this operation, UPSCO publishes scheduled bids that attempt to provide a week on / week off flightcrew scheduling paradigm (when possible) for some of our scheduled bid. We deadhead our crews, via commercial passenger carrier, to their originating airport on Sunday evening. Flight crews then work for five days, flying aircraft on Monday, Tuesday, Wednesday, Thursday, and Friday.

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[64] By contrast, a passenger configured A300 typically operates with a crew of 2 pilots, up to seven flight attendants, and as many as 315 passengers.

They typically operate 2-4 segments per duty period (depending upon whether they fly directly to a sort facility or have one stop between the originating station and the sort facility to collect more cargo) five nights in a row. Post-sort, the aircraft routing typically has the same one or two segments in reverse. For pairings concluding away from the crew domicile, we deadhead our flightcrews home via commercial passenger airline flights.

24. For most cities, UPSCO has only one operation per day. Flights depart the local cities with the latest possible customer drop off times so as to arrive at a hub to make the sort. The first aircraft typically arrives around 11:00 p.m. The aircraft return in time to meet the morning delivery deadlines. Crews are never scheduled for more than four segments in a flight duty period, and approximately half of the flight duty periods are scheduled with only two segments. The duration of each segment is generally less than 2 hours. Moreover, UPS's packages must make it to the sort facility on-time if they are to make it to their scheduled destinations on-time. Unlike passenger carriers, which can rebook passengers on later flights on the same or, through interline arrangements, a different airline, UPSCO does not enjoy that option. If a UPSCO flight fails to operate into or out of the sort facility, an entire city misses service for that day.

25. During the sort operation, flight crews typically have, on average, two hours to rest. Our SDF sort facility contains single-occupancy, climate-controlled bedrooms with lie flat beds. These facilities are comparable to a single-occupancy hotel room. At other locations (PHL, EWR, BDL, RFD, MIA, ONT and ANC), UPS provides semi-private sleep facilities with beds that are separated with partitions that you would typically see in an office cubical environment. These facilities are sound-proofed, are maintained relatively dark (with night lights to assist when entering/exiting the sleep facility) and are temperature controlled.

26. Depending on schedule construction and other factors, including the transition from one bid schedule to another, many crewmembers typically enjoy an entire week off duty after flying a week of domestic night trips. This extended period of time off provides probably the most effective fatigue mitigation by allowing a fully restorative and recuperative rest period at home.

27. In accordance with carefully developed work rules, UPSCO pilots fly significantly fewer hours per month than their passenger airline counterparts. Accordingly, UPSCO's average daily aircraft utilization per day is also much lower than that of a typical passenger airline. Further, UPSCO pilots are among the highest paid, averaging approximately $270,000 (including pay and benefits) in annual compensation.

28. Since our sort operation cannot be adjusted and does not provide a four hour sleeping opportunity, should proposed 14 CFR 117.27 (consecutive nighttime operations) be enacted (and construed to apply to UPSCO's operations), UPSCO

would be forced to reduce the number of week on / week off flightcrew schedules that it publishes in the bidding process.[65]

29. The result will be that our flightcrews will operate two and three day trip pairings every week, which results in more first night operations. First night operations are the most challenging, in terms of potential fatigue, because the body has to readjust to the nighttime schedule. This type of scheduling paradigm will expose the UPSCO operation to greater risk than current flight and duty time regulations.

30. A two and three day trip scheduling paradigm will also reduce the number of consecutive days off our crewmember receive. This will lessen their ability to obtain truly restorative rest periods.

31. In addition, should the FAA require our crews to obtain four hours of rest within each flight duty period in order to allow more than three consecutive nighttime operations, UPSCO will have to fundamentally alter the staffing necessary to support its next day air service. Currently, the sort operations take approximately 4 hours. This gives our pilots, on average, approximately 2 hours to rest during the sort while still allowing for package delivery by 8:30 a.m. If UPSCO is required to provide pilots with four hours of rest, then it would have to replace crews after the third night. As described above, due to the finely-tuned nature of the integrated network, adjusting the sort operation is simply not feasible.

SECOND DAY AIR SERVICE

32. UPS also operates a Second Day Air service similar in nature to our Next Day Air service.

33. The Second Day Air Service operates on a counter-cyclical basis to the Next Day Air service. That is, the planes depart from their originating stations so as to begin arriving at the sort facilities around 11:00 a.m. Aircraft are unloaded, packages are sorted and routed to the appropriate aircraft, packages are re-loaded, and flights begin departing the sort hub around 3:00 p.m. Sort duration is approximately 4 hours.

34. Flights typically depart the air sort hubs around 3:00 p.m. and arrive at there destination (depending on location) around mid to late afternoon.

35. The Second Day Air service is operated 3 days per week using UPS aircraft. Flightcrews scheduled for this service typically have varying schedules, depending on the schedule that they bid and are awarded.

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[65] The FAA's proposal restricts to three the number of consecutive nighttime operations (unless a rest period that complies with §117.17 is provided). The FAA's Response to Clarifying Questions, Docket No. FAA-2009-1093, states that a nighttime operation is one that commences between 2200-0500. Based on this understanding, most of UPSCO's flights would not be nighttime operations, since they are in flight duty periods that commence before 2200. Assuming, however, that the FAA intended to deem nighttime operation to mean a flight duty period with any operation between the hours of 2200-0500, the rule would affect the vast majority of UPSCO's flights.

INTERNATIONAL AIR SERVICE

36. UPS also has a significant international operation. The International Package segment provides air and ground delivery of small packages, letters and palletized cargo to more than 200 countries and territories around the world.

37. UPS offers customers three daily time-definite delivery options to and from the world's most active trading markets.

38. In Europe, UPS provides both express and domestic service, much like the service portfolio offered in the United States, and it is based on the same integrated network model.

39. UPSCO maintains a hub in Cologne, Germany similar to that of our air sort hubs in the United States.

40. UPS also serves more than 40 Asia Pacific countries and territories. UPSCO maintains an air hub in Shanghai, China, which links UPS's international network with direct service to the Americas, Europe, and Asia.

41. UPSCO maintains an intra-Asia air hub in Shenzen, China, which operates like our regional U.S. air hubs.

42. UPSCO also operates several daily "around the world" flights via point-to-point operations that occur entirely outside of the United States.

43. UPSCO flightcrew members operating in our international network have varying schedules depending on their bid preferences and what they were awarded. These trips can be fairly short in nature (three to four days) or be gone for extended periods of time (twelve to fourteen days). Following these extended pairings, UPSCO flightcrews typically enjoy on average at least 13 days free from duty for every 28-day bid cycle, but the contractual limit is a minimum of 10-days off per every 28-day pay period cycle.

UPSCO'S FATIGUE MITIGATION STRATEGIES

44. UPSCO and the Independent Pilots Association ("IPA"), the bargaining agent for UPSCO pilots, have developed several fatigue mitigation programs designed to mitigate the effects of flightcrew fatigue. These programs are memorialized in the collective bargaining agreement between UPSCO and IPA. A non-exclusive list of fatigue mitigating contractual provisions is discussed below.

    a. Overall duty limits for flights operating during the early duty window ("EDW") (0230-0459) are reduced from 13 hours to 11 hours.

    b. Crew duty period extensions for such reasons as weather, mechanical, or air traffic control delays is limited to 15 hours.

c. All duty must fall within a 16 hour window, based on the more restrictive of either the earliest report time or the latest release time within a crew pairing.

d. No more than four segments per duty period can be flown.

e. At least 18 hours of rest is provided between a commercial deadhead flight and commencement of a revenue duty period.

f. Bid lines that include EDW trips may not include any non-EDW trips, which minimizes circadian switching.

g. EDW lines may have no more than four reports (or series of trips) per 56-day bid period, and 75% of these lines must be constructed with a minimum of five days off between each series of trips.

45. The collective bargaining agreement between UPSCO and IPA also contains several international service-specific fatigue mitigation programs.

a. Only one “crossing” per duty period is permitted. A crossing is defined as a duty period that begins and ends with more than 4.5 time hours of difference.

b. The total number of crossings in a pairing cannot exceed four.

c. The flightcrew is provided at least 15 hours of rest prior to any crossing, and for any pairing containing three or four crossings, the crew must have 30 hours of rest at some point between the second and fourth crossing.

d. A minimum rest of 17 hours is provided for duty periods with 8-12 hours of total flight time.

46. In addition to the fatigue mitigation measures memorialized in the collective bargaining agreement, several company policies address the issue of flight crew fatigue.

a. UPSCO’s human factors education program provides fatigue mitigation training to all of its pilots, containing virtually all of the training components otherwise required by the Congressionally mandated Fatigue Risk Management Plan (FRMP). UPSCO has already adopted most of the components of the FRMP in the absence of a federal mandate and made enormous investments in sleep facilities at UPSCO’s regional hubs without any legal requirement to do so.

b. UPSCO’s FAA-approved Flight Operations Manual includes a policy that specifically addresses fatigue mitigation. The System Chief Pilot manual also requires a uniform management response to all fatigue calls, specifically stating that: "If a crewmember calls Crew Scheduling and informs them that he is unfit to continue safely due to fatigue, he will be put into a contractual crew rest period before being given a new flight assignment or resuming his original line." Excerpts from the Manual are attached hereto as Exhibit A.[66]

c. UPSCO's crew schedulers are trained that if any crewmember claims to be fatigued, they are immediately released from duty (with pay). Follow-up by the chief pilot with the crewmember about their fatigue call typically occurs after rest has been given.

d. UPSCO provides its pilots with sleep facilities that are far superior to those available to passenger airline pilots. For example, at their principal U.S. hubs, UPSCO has invested millions of dollars to provide lie-flat single occupancy hotel room like facilities with climate controls. These facilities are utilized by UPSCO pilots during the sort process that separate the major segments of UPSCO's nighttime operations. Likewise, the Boeing 747-400 and MD-11 aircraft are equipped with high quality lie flat bunks or crew rest seats that provide a lie flat opportunity. Our Boeing 767 aircraft does not currently provide an approved sleep facility that meets the proposed definition of a rest facility in accordance with FAR 117.3. Typically our pilots utilize a row of bulkhead-mounted reclining seats as a lie flat sleep opportunity on most Boeing 767 augmented flights.

47. Because of these strategies and UPSCO's robust culture and regime of safety, UPSCO has never had a single accident or incident where the National Transportation Safety Board determined the probable cause to be pilot fatigue.

DIFFERENCES BETWEEN PASSENGER AND CARGO AIRLINES

48. The business models for passenger and cargo airlines are significantly different. On the domestic front, passenger airlines typically serve the same city-pairs several times a day through "connecting complexes" at airport hubs. Aircraft are scheduled for service from early morning until late at night. To accommodate this passenger demand, these carriers also "depeak" their schedules to minimize in-transit ground times when flight connections are required (many city-pairs lack nonstop service). These depeaked schedules spread out resource utilization, avoid triggering major delays, and improve the passenger experience by creating more options. If a passenger is late, he or she can be rebooked on later flights on the same or, through interline arrangements, a different airline.

49. In contrast, in UPSCO's cargo airline network, nearly all cities have only one operation per day. Flights depart so as to arrive at the sort hub around 11:00 p.m. and return in time to meet the morning delivery deadlines. Crews never operate more than four segments in a flight duty period, and about half of the flight duty

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[66] UPS System Chief Pilot Manual Policy #115, p. 80.

periods contain just two segments. Moreover, the shipments must make it to the sort facility on-time if they are to reach their scheduled delivery points on-time and UPS is to make good on its guaranteed service commitments. Packages cannot be "rebooked" on another flight. Cargo carriers cannot depeak their schedules. To the contrary, consolidated cargo carriers such as UPSCO depend upon gathering all "inbound" cargo before loading "outbound" flights. If a UPS flight fails to operate into or out of the sort facility, an entire city can potentially miss on-time delivery that day.

50. There are similar differences on the international front. The typical passenger-airline international operation consists of one segment from the U.S. to the foreign city, a crew layover period, and a one segment return flight. Schedule disruptions are easily manageable due to the confined nature of the operation. UPSCO's international operations typically involve much more point-to-point flying beyond U.S. borders, often times in very remote locations. Due to the vastness of the operation, and the fact that UPS crews and aircraft do not continually traverse "hub" cities, it is nearly impossible to recover from service failures due to crews "timing out." Just one service failure ripples throughout UPS's entire network and all of the cities that aircraft is scheduled to serve. Again, UPS does not enjoy the option of simply rebooking packages on another carrier's aircraft.

GENERAL EFFECTS OF PROPOSED REGULATION

51. If adopted, the proposed regulation will affect all of UPSCO's operations, including its next day air service, second day air service, and international air service.

52. As accurately described in the comments submitted by UPSCO, the ATA, and the CAA, there are numerous objectionable components of the proposed regulation. Set forth below are the ones that are the most costly and immediately harmful to UPS's next day air, second day air, and international operations.

    a. **Inability to Extend a Flight Duty Period**. Sections 117. 15(c) and 117.19(f) of the proposed regulation would prevent UPSCO from extending a scheduled flight duty period, regardless of whether the crew would ever exceed their maximum flight time limits or flight duty period limits.

    b. **Consecutive nighttime operations**. As described above, if applied to UPSCO's operations, the four-hour rest requirement would effectively preclude the continuation of UPS's existing nighttime sort operation by requiring four-hour rest periods between flight segments and would severely disrupt UPS's precisely-tuned inter-modal operation. To accommodate rest breaks of this length, the sort period would have to be extended such that UPS either could not meet its guaranteed service times or would have to move up its established parcel pick up times; neither of these options is commercially feasible. Moreover, these limits will act to undermine safety by increasing the number of "first nights" (where the risk of accident is statistically the greatest) as pilots will have to work more three-day trips. It would also incentivize certificate holders to build schedules that "flip-flop" night flying with an occasional day flight, which is also counter to safety.

c. **Strict flight times limitations**. Part 117.13 establishes duplicative and conflicting sets of regulations covering the same duty day. These inflexible limitations eliminate UPSCO's ability to adjust its operations to changing conditions, such as delays caused by weather, air traffic control, or other unplanned events.

d. **Flight duty period (FDP) limits**. The proposed new FDP limits are significantly lower than the limits permitted under current regulations. Moreover, since the new limits are based on the time of day that a pilot reports to work—rather than his or her originally agreed schedule—a UPSCO pilot's available FDP can fluctuate overnight and is unpredictable, putting UPSCO in an untenable position. Again, because flight time limits and flight duty period limits both vary with the crew's reporting time, this imposes upon UPSCO a needlessly complex and impractical set of rules that will require constant cross-referencing and can easily induce an unintended violation.

e. **Limits on duty periods**. The new limits in Part 117.23 encompass the vaguely defined category of "administrative duties." Such duties are completely at the discretion of the flightcrew member, saddling UPSCO with liability for mistakes while offering no way to track such "duties." Moreover, the rule permits cumulative duty extensions if crewmembers scheduled to "deadhead" do so in first class. This is a specious requirement that cannot be planned for. The agency does not explain what UPSCO must do if first class seats sell out or if none exist for a given flight, leaving UPSCO in an untenable position.

f. **Rest Periods**. Part 117.25 provides that "rest" does not start until a crewmember arrives at the hotel or sleep facility. But crewmembers' arrival time is completely out of UPSCO's control in the best of cases and is subject to crew manipulation in the worst of them. UPSCO will seldom even know when the crew actually arrives in the hotel, and there is no automated method of tracking this information. In addition, the regulation assumes the crew will use the provided hotel, which in UPSCO's experience is not always true, as many crewmembers bid trips to be in their home city during a layover, making this regulation unwieldy.

g. **Augmentation credit**. The rule provides for longer flight duty periods in the case of augmented flight crews. Unfortunately, the rule appears to have been written based on the obviously incorrect assumption that every air carrier, including cargo operators, has passenger cabins. Of course, an all-cargo carrier like UPSCO generally does not; it has a flight deck and cargo containers. The regulations appear to take no account of the practicalities of running an all-cargo airline; for example, UPSCO occasionally needs to substitute a Boeing 767 for an MD-11 with bunks for maintenance or other reasons. It will lose the ability to do so, resulting in flight cancellations. Moreover, the rules forbid operators like UPSCO from taking advantage of augmentation (and thus extending FDP limits) if the last leg does not permit a sufficient in-flight rest period. UPS operates two segment legs from the US to an intermediate stop at one European city before reaching the final destination in Cologne, Germany during what would be mid-afternoon by a crew that is acclimated to the Eastern US time zone. This regulation also makes no provision for flight diversions, which, in UPSCO's experience, can and will happen on occasion.

h. **Acclimation credits and penalties**. The proposed regulation establishes a complex system that governs the interplay between a crew's "acclimation," which occurs only at 36 hours of rest or when in a new theater for 72 hours, and the related flight duty period limits. In particular, the proposed regulation (found at Parts 117.15 (b)(1) and 117.19 (b)(1)) predicates the length of the FDP on the crew's actual report time (not scheduled). By adding another variable—acclimation—the equation becomes unworkable for planning purposes. An example drawn from UPSCO's actual experience illustrates this point: A Louisville-based "unacclimated" UPSCO crew is scheduled to report in Cologne, Germany (a UPSCO hub) at 18:45 local time after a 35 hour and 30 minute rest period. However, due to more favorable tailwinds the day before, the flight crew arrives 31 minutes early. As a result, the crew may no longer legally operate the next day because the crew has experienced "unplanned" acclimation with the 36+01 rest, thereby forcing them into an FDP report time category that is based on local time, not home base time, which produces an FDP with less than what was planned.

i. **"Split Duty" extension**. The proposed regulation allows a flight duty period to be extended based on the pilot's actual rest time "behind the door" of a hotel room or other suitable accommodation. The inherent variability in this situation creates a "Catch 22" for UPSCO's night time sorts: When an extension is actually most needed because of a disruption in the schedule due to a weather event, for instance, it becomes unavailable unless the operator compounds the disruption by intentionally delaying flights leaving the sort facility.

j. **Time spent on reserve**. Under the scheme the FAA has proposed, time spent on reserve status is now considered to be a form of duty subject to the cumulative duty limitations prescribed in the proposed §117.23.

Treating reserve as if it were flight duty makes no sense. Again, an example drawn from UPSCO's actual experience illustrates this point: Consider a reserve pilot who has been sitting at home for five days straight observing a 14-hour on-call period each day. On the sixth day, the company would like to schedule the pilot for a two-day trip requiring only 10 hours of total duty with flying entirely during the daytime. That assignment would violate the proposed regulation. In addition, given the ever present possibility of voluntarily assumed "administrative duties," nothing precludes a pilot from reporting such activities, so that he or she becomes unavailable for an additional reserve assignment—in this scenario, having done little more than sit at home waiting for the phone to ring.

k. **Highly prescriptive definition for on-board rest facilities**. If adopted, this proposal would severely impact UPSCO's ability to continue operating B767-300ER Freighter aircraft as we have since 1996. Our B767 aircraft, which represents 18% of the UPSCO fleet, does not have a qualifying on-board rest facility and, to date, Boeing has not provided any technically feasible solutions. The rule would require either the elimination of at least one main deck pallet position to accommodate a qualifying rest facility, reduced aircraft capability (flight segments restricted to Table A limits or less, which are well below the aircraft's design performance envelope), or the elimination and replacement of the B767 fleet. The economic consequences of any such decision are vast.

53. As explained in UPSCO's comments and the declarations attached thereto, as well as in comments submitted by the ATA and CAA, these and other aspects of the proposed rule impose enormous burdens on UPSCO's ability to operate its all-cargo airline service.

II. RESPONSE TO QUESTIONS IN THE FAA RULEMAKING PREAMBLE

FAA poses 35 discrete questions in the preamble to the NPRM. This section contains UPS's answers to those questions, which are republished for ease of review.

1. *Please comment on adopting maximum FDPs. Should the maximum FDP vary based on time of day? Should it vary based on the number of scheduled flight segments? Should the proposed limits be modified up or down, and to what degree?*

UPS response: UPS supports the FDP concept, but only if the Table A flight time limits are eliminated. In all instances of analogous international law, when the FDP concept was introduced, flight time restrictions were eliminated. The FAA should treat this as an either / or proposition. UPS does support the concept of restricting the maximum FDP length based on time of day, but not below the most restrictive international standard of 11 hours, and any segment reduction should not occur until segment five. The FAA provides no scientific justification for such drastic reductions in available flight duty period. UPS has a demonstrated record of safe overnight operations. The proposed restrictions will affect approximately 95% of UPS's domestic operation. UPS supports the Cargo Air Association's proposal, which offers an 11 hour minimum un-augmented FDP for segments one through four. This still represents a 32% reduction in maximum available flight duty period as compared to current regulations, yet it affords air-cargo express carriers the ability to compete in a global marketplace. An 11 hour FDP also affords crewmembers the opportunity to accumulate enough credit to permit a truly restorative set of days free from duty. A 9-hour maximum FDP will require our crewmembers to work more days per month, which will actually increase crew fatigue as opposed to mitigating it. UPS supports restricting the maximum length of FDPs based on the originally scheduled segments; however, UPS feels that those limits should apply once the FDP has commenced. Therefore, an unplanned diversion should not make a crew illegal based strictly on FDP reductions associated with an unplanned increase in segments. Again, the FAA has failed to substantiate any of these FDP limits or scientifically justify that a reduction in maximum FDP is required after only two flight segments. In fact, the FAA states in the preamble, "[t]here is no evidence that flying multiple segments is more fatiguing than flying one or two segments per duty period." 75 Fed. Reg. 55,858.

2. *Please comment on permitting flight crew members and carriers to operate beyond a scheduled FDP. Is the proposed 2-hour extension appropriate? Is the restriction on a single occurrence beyond 30 minutes in a 168-hour period appropriate? Should a flight crew member be restricted to a single occurrence regardless of the length of the extension?*

UPS Response: Operating beyond a scheduled FDP, as long as it does not exceed the maximum limits in tables B and C, should not be regulated. Therefore, extensions should be unlimited as long as they do not exceed the maximum limits specified in tables B and C. If for reasons "beyond the control of the operator" extensions beyond those limits become necessary, then the regulations should provide the operator the ability to continue the day's mission but to increase rest at the end of that FDP. The current proposed scheme of simply limiting duty will result in cancelled flights and loss of long-term competitiveness when compared to foreign carriers. The current "good to show, good to go" regulations, which permit a crewmember to complete a published schedule, are vitally important for customer service and to allow the greatest predictability and least disruption to pilot schedules. Airlines encounter myriad issues (e.g., weather, mechanical, and ATC delays, customs and immigration issues, etc.) when flexibility beyond the limits are necessary and can be accomplished safely as single "one-off" events. Restricting to no more than one time in a 168-consecutive hour period the number of FDP extensions to the scheduled (versus maximum) FDPs is completely unsupported by science and does not increase safety, but rather simply puts US carriers at a competitive disadvantage. If the schedule reliability provisions of §117.9 applied to maximum FDP limits as described in the preamble (and not within 95% of scheduled as proposed in the regulatory language), that standard would also provide a more reasonable and appropriate balance between accountability for potential abuse while maintaining the operational robustness needed during non-routine operations.

3. *Please comment on the proposed schedule reliability reporting requirements. Should carriers be required to report on crew pairings that exceed the scheduled FDP, but not the maximum FDP listed in the FDP table?*

   UPS Response: The FAA proposal to require airlines to track extensions to FDPs beyond what they were originally scheduled is meaningless, costly, and operationally unfeasible as long as the maximum FDP values are not exceeded. Doing so would also have a negative effect on fatigue since each scheduled flight leg would have to contain a sufficient pad of block time to cover 95% of the total actual flight times for that segment over a period of time. The net effect would be additional ground time between flights at the aircraft routing level, which will result in later scheduled departure times throughout the day and, therefore, cause a reduction in off-duty "layover" time at a suitable accommodation. Certificate holders should only be required to report actual FDPs that exceed the Table B or C limits. There is no rational reason for requiring a report showing that a 3-hour scheduled FDP, originating at 0800, and thus having a maximum limit of 13 hours, actually needed four hours for completion due to a slight delay. Safety of flight issues are not implicated under such a scenario.

4. *Should carriers be required to report on more parameters, such as cumulative duty hours or daily flight time? If so, why?*

   UPS Response: Certificate holders should be required to report on parameters that have a direct correlation to safety and fatigue science. As long as the maximum FDP limits are not exceeded, reporting cumulative duty hours or daily flight times would be needlessly burdensome and provide no safety benefit.

5. *What should be the interval between reporting requirements?*

   UPS Response: The reporting interval should be harmonized to match the seasonal schedule changes and IATA slot conferences (i.e, two times per year).

6. *How long after discovering a problematic crew pairing should the carrier be afforded to correct the scheduling problem?*

   UPS Response: Certificate holders should be allowed to fly all published and existing schedules as originally planned. Changes to the schedules should be mandated only as new schedules are published. This will vary depending on the certificate holder's business model.

7. *Is a 3-day adjustment to a new theater of operations sufficient for an individual to acclimate to the new theater?*

UPS Response: The scientists that provided guidance during the ARC agree that there is little to no aviation-validated fatigue science involving the effects of multiple time zones. Pilots with extensive international experience may be properly acclimated in 2 days. Pilots with limited international experience may require 3 days. Our operational experience demonstrates that with the proper sleep patterns, pilots can adjust in one day. The adjustments for acclimation within the NPRM are all un-validated and arbitrary.

8. *Is a 36-hour break from duty sufficient for an individual to acclimate to a new theater?*

   UPS Response: Again, there is no validated science to support this limitation. A 36-hour break from duty for pilots experienced in international operations is an arbitrary number. A 24-30 hour rest would serve the same purpose.

9. *Should flight crew members be given a longer rest period when returning to home base than would otherwise be provided based on moving to a new theater?*

   UPS Response: The regulation should not address issues that are typically handled via the collective bargaining process. Rest in domicile should be treated the same as rest when away from base. It is a false assumption that a crewmember lives at their domicile, and forcing longer in-base layovers may actually cause crewmembers to spend less time at home. If the FAA insists on having home base rest requirements, the current FAR §121.523(e) for augmented flight is adequate and should be preserved in FAR §117.25 (b)(1).

10. *Should the FAA have different requirements for flight crew members who have been away from their home base for more than 168 hours? If so, why?*

    UPS Response: No. As long as proper rest is given during a flight assignment, the length in days of that assignment has no bearing on crewmember fatigue. Rest at home is no different than rest between duty periods during a trip and should be treated as such. The FAA has no scientifically valid reason for disparate treatment of at-home versus layover rest. Issues such as these are best addressed via the collective bargaining process.

11. *Should the FAA require additional rest opportunities for multiple pairings between two time zones that have approximately 24-hour layovers at each destination? What if the scheduled FDPs are well within the maxima in the applicable FDP table or augmentation table?*

    UPS Response: No. There is only one standard for acclimation and that is more than four hours. If the FAA does not have a scientifically valid justification for this proposal, then it should not create additional scheduling constraints for certificate holders. Again, these are matters that are best addressed via collective bargaining.

12. *If the FAA adopts variable FDP limits, is there a continued need for daily flight time limits?*

    <u>UPS Response</u>: Absolutely not. This was made very clear to the FAA by the industry members of the ARC. In all instances of analogous foreign law (e.g., CAP-371 and EU-Ops Subpart Q), when the FDP concept was introduced, daily flight time limits were eliminated. FDP limits and segment reductions account for exactly the same fatigue mitigation strategies as measuring daily flight time. The FAA has offered no scientifically valid reason for maintaining FDP and flight time limits. The FAA should view daily flight time limits and FDPs as an either / or proposition.

13. *If the FAA retains daily flight time limits, should they be higher or lower than proposed?*

    <u>UPS Response</u>: As stated in question 12, UPS does not support the FAA's decision to maintain daily flight time limits based on the fact that it appears that the FAA will implement the FDP concept. However, if the FAA maintains flight time limits, the limits should be no less than one hour less than the applicable FDP limit. FDPs should, at minimum, have an 11-hour limit, which would permit 10 hours of flying time. Scientists agree that performance can be sustained indefinitely with eight hours of sleep in any 24-hour period. An 11-hour FDP yields a minimum of 13 hours for rest. UPS has a 23-year history of safely operating with 11-hour flight duty periods during the window of circadian low.

14. *Should modifications be made to the proposed flight time limits to recognize the relationship between realistic flight time limits and the number of flight segments in an FDP?*

    <u>UPS Response</u>: UPS fundamentally disagrees with the concept of daily flight time limits. Fatigue is a function of "time on task" and is measured by FDP, which already considers the number of segments. Further restricting daily flight time based on the number of segments cannot be justified by science or on the basis of validated safety data. Applying so many restrictive variables to an actual operation dramatically increases the probability of unintended consequences. Further, the competitive disadvantage that U.S. carriers will experience will directly impact U.S. air carrier market share. This is strictly an issue involving collective bargaining.

15. *Should augmentation be allowed for FDPs that consist of more than three flight segments? Does it matter if each segment provides an opportunity for some rest?*

    <u>UPS Response</u>: In the Regulatory Impact Analysis, the FAA affirmed that there have been no accidents attributed to fatigue on augmented flights in US civil aviation history! That means that the risk is extremely low; there is no benefit in the cost-benefit equation for a regulatory change. Furthermore, the FAA offers no scientifically validated justification for why it is okay to fly more than three segments unaugmented, but it is not okay with augmented crews. The pilot manipulating the controls during landing should receive a 120-minute rest period at some point in the flight duty period, but that should not necessarily be in the last segment, as long as that rest opportunity occurs within the last six hours of the FDP. Any other limitations on augmented operations are strictly matters that should be left to the collective bargaining process.

16. *Should flight time be limited to 16 hours maximum within an FDP, regardless of the number of flight crew members aboard the aircraft, unless a carrier has an approved FRMS?*

    UPS Response: No. Again, there are zero accidents that have occurred in the US attributed to fatigue on augmented flights. Such a restriction is not supported by scientifically validated information, or safety, and cannot be justified by any cost-benefit analysis. A double augmented crew (4-pilots) can operate safely for longer than 16-hours.

    The FAA has clearly stated in the answers to the clarifying questions that FRMS will most likely not be available for prescriptive relief at the time of implementation of these new regulations. Therefore, the FRMS alternative is inadequate.

17. *Should some level of credit be given for in-flight rest in a coach seat? If so, what level of credit should be allowed?*

    UPS Response: Yes. The flying public knows that sleep is possible in a coach seat and it does provide a restorative benefit for fatigue, albeit less than a bed. The CAA proposal submitted at the ARC acknowledges the fact that a seat is not a bed, but it kept the definitions simple until more scientific data can be collected. It also resisted the highly prescriptive and arbitrary classifications suggested by one foreign study (TNO) that has never been adopted by any government or validated using US scientific standards of evaluation. Furthermore, the question itself simply reinforces the fact that the FAA did not consider business models other than passenger airlines when it wrote this proposed rule. Several aspects of the definitions of rest facilities do not apply to a cargo-configured aircraft.

    In addition to the CAA proposal, UPS offers another alternative for the FAA's consideration. FAA could maintain existing regulations that permit augmentation up to 12 hours of flight time with only a seat and augmentation beyond that to the standards of Advisory Circular 121.31. If the FAA rejects the current scheme as a viable option, then it should adopt the CAA proposal of a "bed" and a "seat" until more scientific data can be validated.

    UPS operates B767-300ER aircraft that, under the proposed definition of rest facility, will not meet any criteria for augmentation. Aircraft modifications—to install a qualifying facility—and the resulting loss in revenue from losing a container position will be very expensive ($18.4 million annually) and will require our aircraft to be taken out of service for modifications. This point presumes that a qualifying modification actually exists. We are not currently aware of any approved modification for these freighter aircraft.

18. *Is there any reason to prohibit augmentation on domestic flights assuming the flight meets the required in-flight rest periods proposed today?*

UPS Response: No. The FAA has abandoned the concept of domestic vs. international in lieu of acclimated and unacclimated, which UPS supports. There is no scientific evidence or safety basis to support making an exception in this case.

19. *Are the proposed required rest periods appropriate?*

UPS Response: UPS supports a requirement that the pilot manipulating the controls for takeoff and landing be provided at least two-hours of rest within the last six hours of lookback from the takeoff or landing event. Beyond that requirement, there are no safety or scientific justifications for further restrictions.

20. *Should credit be allowed if a flight crew member is not type-rated and qualified as a PIC or SIC?*

UPS Response: This question specifically addresses the needs of the classic three-person aircraft. UPS no longer operates aircraft for which a flight engineer is required. UPS has no comment.

21. *Please comment on whether a single occupancy rest facility provides a better opportunity for sleep or a better quality of rest than a multiple occupancy facility such as a multi-bed crew sleeping facility or multi-bed living quarters.*

UPS Response: UPS does not support any penalty implied by the FAA (by asking this question) for shared sleep facilities. To answer the question, logically, the answer is yes. A single occupancy rest facility, with all else being equal, provides a better quality of rest than a multiple occupancy facility. This is particularly true if you have people of different genders trying to sleep in the same room. However, factors like temperature control, ambient light, mattress quality, and ambient noise will have a greater influence on a person's ability to sleep versus simply measuring the number of people in the room. Additionally, it is important to note that individual variables such as a person's stress level, state of physical fitness, presence of caffeine in a person's system, time since awakening, etc. will also have more impact on a person's ability to sleep versus simply asking if sharing a room with others is less restful.

22. *Should there be any restriction on consecutive nighttime operations? If not, why?*

UPS Response: No, because UPS firmly believes doing so will introduce more fatigue risk than it will solve, thereby reducing flight safety. This is a classic example of the dangers of using an immature science to justify a regulation. The probability of unintended consequences is very high. Based on UPS's 23-year history of safely operating an airline with a primarily nighttime domestic service, our operational "field science" truly indicates that the first night of a crew pairing involving night flights is the most difficult from a fatigue-combating perspective. The FAA itself recognizes this fact in the preamble. If the FAA restricts consecutive nighttime operations, it will cause more "first nights" during the course of each month, which will result in a higher frequency of fatigue than if crews are allowed to operate a full week of flying nights followed by a full week off for restoration. The ability to get fully restorative rest at home will also be hampered due to the fact that crews will be scheduled for flight duty during nights every week. Sleep science indicates that human performance can be sustained indefinitely with 8-hours of sleep in any 24-hour period. The FAA provides no scientifically valid justification for restricting consecutive nighttime operations as long as proper rest is permitted between flight duty periods.

23. *If the nighttime sleep opportunity is less than that contemplated under the split duty provisions of this notice, should a carrier be allowed to assign crew pairing sets in excess of three consecutive nights? Why or why not?*

UPS Response: Yes. The best available sleep science indicates a one-for-one restorative sleep effect for any sleep more than 20-minutes. If the FAA is serious about writing a regulation based on the best available sleep science, then the sleep opportunity credit needs to reflect this scientific fact. Sleep credit for augmented crews reflects this fact. There is no scientific reasoning that supports the need for a 4-hour sleep opportunity in a ground-based sleep facility in order to receive credit. UPS suggests that, in accordance with current sleep science, certificate holders should receive sleep credit on a one-for-one basis for rest opportunities after 20 minutes. Thus, two hours in the sleep facility would yield a 1 hour and 40 minute credit. The UPS network does not have such extended ground times that could take advantage of the current proposal thereby nullifying the benefit of current sleep facilities and discouraging further sleep-facility investments.

24. *If the nighttime sleep opportunity meets the split duty provisions of this notice, should the carrier be allowed to extend the flight duty period as well as the number of consecutive nighttime flight duty periods? Why or why not?*

UPS Response: Yes. The purpose of the regulations is to mitigate fatigue. The most accurate sleep science indicates a one-for-one restorative benefit for naps after 20-minutes. Receiving at least a 90-minute sleep opportunity mid-duty period clearly has a positive effect on fatigue mitigation and a credit should apply

25. *Should a fourth night of consecutive nighttime duty be permitted if the flight crew member is provided a 14-hour rest period between nights three and four?*

UPS Response: The sleep scientists all agree that if a person receives 8 hours of rest, then that person can perform indefinitely. The very nature of this question reveals the classic signs that negotiation has replaced science in this rulemaking process. We do not support this 14-hour rest period suggestion.

26. *Please comment on whether a 16 maximum hour FDP for long call reserve is appropriate when the maximum FDP for a line holding flight crew member is 13 hours.*

UPS Response: The question is misleading. A long call reserve may have a 16-hour RDP, but not an FDP. Being at home waiting for the phone to ring, knowing that you will have a legal intervening rest before an FDP assignment is not a fatiguing event. The question misuses definitions contained in section 117.3 and therefore is invalid.

27. *Please comment on whether the proposed maximum extended FDP of 22 hours for an augmented flight crew member is appropriate. If not, please provide an alternative maximum FDP.*

UPS Response: The question is again misleading for the same reasons as the previous question. An RDP is not an FDP and the FAA should not confuse the two. Also, it is fundamentally important to recognize that being essentially off duty with the only requirement of being contactable by phone is not a fatiguing event.

28. *Please comment on whether a certificate holder should receive credit for not calling a flight crew member during the WOCL while on reserve.*

UPS Response: If a crewmember is sleeping during their WOCL uninterrupted, then fatigue is being mitigated. That is the whole purpose of this regulation. There is a very high likelihood the crewmember is asleep during this period. If not, that person is not responsibly preparing themselves to be “fit for duty” if called later in their RAP. Moreover, sleep credit is provided in an airplane and during split duty. It would be illogical not to credit sleep obtained in one’s own bed.

29. *Should minimum required rest while on reserve status be greater than the amount of rest required for a line holding flight crew member? If so, please provide supporting data, if not, please provide rationale.*

UPS Response: No. Sleep science indicates that human performance can be sustained indefinitely with eight hours of sleep in any 24-hour period. The FAA provides no scientifically validated information demonstrating that reserve duty is more fatiguing. In fact, common sense tells us the opposite is true. Sitting at home waiting for a phone to ring generates the least amount of fatigue of any potential duty. A 14-hour rest period may force the certificate holder to “flip flop” a reserve from night to day or vice versa, which is not a good way to mitigate fatigue. The normal nine-hour rest requirement is sufficient.

30. *Please comment on the level of complexity on the proposed reserve system.*

UPS Response: Considering short call reserve as "duty" adds an extraordinary amount of complexity to the reserve scheme, especially when you consider the restrictions it places on using that reserve. This of course adds costs and reduces US competitiveness without any basis of science or safety benefit. This was also NOT part of the ARC recommendations. Thus, short call reserve should not be considered duty.

31. *The FAA seeks input on the appropriate cumulative limits to place on duty, flight duty periods and flight time. Is there a need for all the proposed limits? Should there be more limits (e.g., biweekly, or quarterly limits)?*

UPS Response: No. The entire proposal is self limiting. The science in this area is fairly straight forward. With sufficient rest, fatigue is mitigated. The entire regulation ensures sufficient rest. The cumulative limits are nothing more than work rules which should be left to the collective bargaining process.

Cumulative duty limits are particularly onerous since short call reserve is considered duty as are "administrative duties." This one aspect of cumulative duty will make this regulation unwieldy to manage since it significantly increases the concept of duty over present regulations.

32. *The FAA also asks for comments on measuring limits on an hourly rather than daily or monthly basis. Does this approach make sense for some time periods but not for others?*

UPS Response: The human body's susceptibility to fatigue is not based on a daily or monthly calendar. UPS fully supports the rolling 168-hour concept.

33. *If transportation is not considered part of the mandatory rest period, is there a need for a longer rest period for international flights?*

UPS Response: With this proposed regulation, the FAA properly removes the distinctions between international and domestic operations. The aviation environment is becoming very harmonized, and the time it takes to go from an airplane to a hotel is not dependent on whether this activity occurs in the U.S. or abroad. UPS believes the major difference associated with ground transportation at international destinations is a function of the collective bargaining process and crews' insistence to stay downtown versus at the airport. This distinction can be managed by the certificate holder by eliminating downtown layovers, which these regulations will force us to do.

Furthermore, the entire concept of basing the commencement of the rest period on hotel check-in time is operationally very difficult to manage and susceptible to flight crew abuse and manipulation. UPS strongly supports measuring rest as release to report. This harmonizes with long standing past practice, which has proven to be effective and operationally feasible. Crewmembers know they can report to the company unreasonable delays in reaching suitable accommodations and, as a result, the rest period will be modified.

34. *FAA seeks comment on whether some elements of an FRMS, such as an incident reporting system, would be better addressed through a voluntary disclosure program than through a regulatory mandate?*

UPS Response: Unfortunately, the FRMS framework did not proceed concurrent with this regulatory proposal, so UPS does not have sufficient information on FRMS operations and procedures to properly answer this question. UPS also believes that the FRMS approval processes by AFS-200 should be fully functioning for at least one year before the prescriptive requirements of FAR 117 become effective. UPS strongly feels that US part 121 air carriers should be given a reasonable opportunity to fully transition into an FRMS before the regulation takes effect.

35. *Are there other types of operations that should be excepted from the general requirements of the proposal? If so, what are they, and why do they need to be accommodated absent an FRMS?*

UPS Response: Yes. Fifteen years ago, no one could anticipate the needs of Ultra-Long Haul requirements. No one knows what the next ten years will bring. The rate of change in technology and capabilities makes it impossible for the FAA (or anyone else) to know the opportunities and challenges that lie ahead. The regulatory framework should be flexible enough to allow for US airline companies to take advantage of those opportunities without having to rely on an FRMS. This regulation, as written, is too prescriptive, and it will hurt US companies that cannot afford or simply cannot implement a (yet-to-be-determined) FRMS.

III. SCENARIO-BASED ANALYSIS OF COMPLEXITIES FROM CONFLICTING REGULATORY SECTIONS IN THE NPRM

In order to demonstrate the complex interactions introduced by the proposed regulations, UPS offers these seven scenarios for analysis. These are not hypothetical scenarios. UPS has encountered each scenario, and UPS seeks FAA guidance on how each scenario should be addressed should the proposed rule be finalized in its present form.

1. Scenario #1: A late sick call results in the remainder of a crew not being able to complete the flight duty period. Assume an aircraft with a Class 1 rest facility and an augmented crew of 3 pilots that has been off-duty for at least 7 days. The ANC based flight crew is scheduled to operate UPS flight 500 from ANC-PVG. The scheduled report time is 2045 local, and the flight is scheduled to depart at 2245 local. Block time is scheduled for 10 hours. Per Table C, the maximum allowable flight duty period is 14 hours. A 2 hour report time plus 10 hours of block time equals a scheduled 12-hour flight duty period. The first officer calls in sick at 2215 local (30 minutes prior to scheduled departure). At 2220, crew scheduling provides a trip notification to a short call reserve crewmember. His report time would be 0015 local, and flight departure time has been delayed until 0145 local. Thus, at departure time, the Captain and Relief Officer have already

been on flight duty for 5 hours. This time added to the 10 hours of scheduled block time for the routing would result in a 15 hour flight duty period.

a. Due to the flight delay, the Captain and Relief Officer are now scheduled for 15 hours of flight duty, while the maximum allowable flight duty is 14 hours. Would the Captain and the Relief Officer be legal to finish the day?

b. Does the entire crew need to be replaced merely because one pilot became ill? If the relief officer utilized a flight duty period extension within the previous 168-hour period, does the entire crew need to be replaced merely because one pilot became ill?

c. If the reserve availability period began at 1700 local would the reserve first officer be legal to operate? Note: The maximum reserve duty period for the short call reserve would be the Table C value for the 1700-2359 time period plus 4 hours, plus 2 hours and 40 minutes due to his availability period touching the 0000-0600 time period. So, the maximum reserve duty period for the reserve would be 20 hours and 40 minutes (14 + 4 + 2h40). At the time of departure, the reserve crew member has been on reserve duty for 8 hours and 15 minutes. Adding the 10 hours of flight time, his scheduled reserve duty period is 18 hours and 15 minutes.

2. Scenario #2: A late sick call results in the remainder of a crew not being able to complete the flight duty period. Assume an aircraft with a Class 1 rest facility and an augmented crew of 3 pilots that has been off-duty for at least 8 days. The ANC based crew is scheduled to operate UPS flight 501 from ANC-CGN. Scheduled report time is 1230 local, and scheduled departure time is 1400 local. Per Table C, the maximum flight duty period is 16 hours. The scheduled block time is 14.5 hours. The first officer calls in sick at 1300 local (1 hour prior to departure). At 1310, crew scheduling assigns the trip to a short call reserve crewmember. His report time is 1510 local, and departure time is now delayed until 1610 local. At the new departure time, the Captain and Relief Officer have already been on flight duty for 3 hours and 40 minutes.

a. Due to the flight delay, the Captain and Relief Officer are now scheduled for 18 hours and 10 minutes of flight duty, while the maximum allowable flight duty period is 16 hours. Would the Captain and the Relief Officer be legal to operate and finish the assignment?

b. If the reserve availability period began at 1000 local would the reserve first officer be legal to operate? Note: The maximum reserve duty period for the short call reserve would be the Table C value for the 0700-1259 time period plus 4 hours. Thus, the maximum duty period for the reserve crew member would be 20 hours (16 + 4). At the time of departure, the reserve crew member has been on reserve duty for 6 hours and 10 minutes.

Adding the 14.5 hours of scheduled flight time yields a scheduled reserve duty period of 20 hours and 40 minutes.

3. Scenario #3: Unscheduled maintenance delaying a flight may affect crew member’s ability to complete the duty period due to flight time limitations or flight duty period limitations. Assume an un-augmented operation with an SDF-based crew on an airplane that does not have a class 3 rest facility. Flight 502, a UPS B767, is scheduled to operate from SDF-HNL. The scheduled departure time is 1230 local with an 1130 local report time. The fight is scheduled for 9.5 hours of flight time, and the duty day is scheduled for 11.5 hours. The maximum allowable flight time, per Table A, is 10 hours, and the maximum allowable flight duty period, per Table B, is 13 hours. During preflight, the Captain notices a bleed valve is inoperative and needs to be repaired. The repair takes 1 hour. The new departure time is 1330 local.

   a. Is the crew legal to depart and complete the assignment? Note: the 11.5 hour scheduled flight duty period would now be a 12.5 hour flight duty period. However, if the maximum flight time is governed by the segment departure time, the maximum allowable flight time is now 9 hours.

   b. If not, would UPS have to cancel this operation since the flight time limitation in Table A for the time period between 1300-1959 is 9 hours and the aircraft cannot be augmented because it lacks even a Class 3 rest facility?

4. Scenario #4: Rule-based acclimated station versus “true” acclimated station. Mount Redoubt erupts in ANC. UPS sets up contingency operations in SEA. Three crewmembers are needed to operate flight 503 from SEA-HKG. The ANC based captain lives in EWR and has been off duty for two weeks. He does not commute to ANC due to the airport closure in ANC. The first officer is ONT based and lives in MIA. He has not commuted to ONT because he is on days off. The other first officer lives and is based in SDF. All three crewmembers arrive in SEA rested and fit for duty; however, they arrive in SEA less than 36 hours prior to departing for HKG.

Crewmember	Domicile	Residence	Acclimated Station based on Rule	True Acclimated Station
1	ANC	EWR	ANC	EWR
2	ONT	MIA	ONT	MIA
3	SDF	SDF	SDF	SDF

The crew operates SEA-HKG. The crew will lay over for 25 hours. The ANC-based Captain and SDF-based First Officer are scheduled to operate from HKG-DXB departing at 0340z and arriving DXB at 1135z. The flight time is 7 hours and 55 minutes. The flight duty period length is 9 hours and 20 minutes. Since the crew is not acclimated to HKG, the flight duty period length is governed by their local domicile time. In this case, for the ANC-based captain, local domicile time would be 1940. Local domicile time for the SDF-based first officer would be 2340.

Crewmember	Domicile	Departure Time (Local Domicile Time)	Maximum Flight Duty Period in hours (Table B – 30 minutes)
1	ANC	1940	10.5 (11 - 0.5)
3	SDF	2340	9 (9.5 - 0.5)

a. Would both crewmembers be legal to operate this flight duty period (scheduled flight duty period is 9 hours 20 minutes)?

b. Would the duty period lengths be different for each crewmember despite both being acclimated to the eastern time zone of the U.S. because they are domiciled in different geographic locations?

5. Scenario #5: Rule-based acclimated station versus “true” acclimated station. An SDF-based 757 Captain lives in Frankfort, Germany. She bids exclusively Intra-European flying. The lines she bids always have deadheads to and from CGN, but she does not deadhead to Europe because she lives there. Her pairing has 26 hours off prior to operating.

We 1 UPS00285 OSL MMX (20)18:25 (21)19:30 1h05 1h00
We 1 UPS00285 MMX CGN (22)20:30 (23)21:46 1h16 3h09
Th 2 UPS00284 CGN MMX (02)00:55 (04)02:10 1h15 1h00
Th 2 UPS00284 MMX OSL (05)03:10 (06)04:15 1h05
1120 Duty

a. Would the duty day be based on Local Domicile time (SDF) or, since the crewmember lives in theater, would it be based on local time in Frankfort, Germany?

b. Would this duty period be legal?

Acclimated Station	Maximum Flight Duty Period
SDF	13
FRA	10

c. If this is based on SDF local time, the duty period appears to be legal. The maximum duty period would be 13 hours. Is that correct?

d. If the duty period is based on OSL or (FRA) local time, the maximum duty period appears to be 10 hours. Is that correct?

e. If so, is it true that a crewmember deadheading to Europe and laying over for 26 hours would have a longer maximum allowable duty period than the crewmember that lives in Europe since the deadheading crewmember is not acclimated to European time zone?

6. Scenario #6: Effect of off-duty commuting. An SDF-based pilot lives in SEA and has been off-duty for 5 days. On his off-duty time, the pilot occupies a cockpit jumpseat on a flight from SEA to SDF. The flight departs SEA at 0000 pacific standard time and arrives in SDF at 0700 eastern standard time. The certificate holder, without actively checking the pilot's off-duty activities, learns that the pilot occupied the jumpseat from SEA to SDF. The pilot's flight duty period begins at 1000 eastern standard time, which is 3 hours after the crewmember arrives at SDF. The pilot is scheduled to operate an SDF-ANC flight. The flight departs SDF at 1100 eastern standard time and arrives in ANC at 1600 eastern standard time. The pilot signs the flight release stating that he is fit for duty. No allegations are made that the crewmember is too fatigued to perform his duties.

a. Would the crewmember be legal to operate the flight from SDF-ANC?

b. If the crew member is not legal to operate from SDF to ANC, whose responsibility is it to track this?

7. Scenario #7: Effect of flight delays on acclimation. Assume an SDF-based un-augmented crew operating a B767 that does not have a qualifying onboard rest facility. The crew is scheduled to depart CGN at 0000 local (2230 report) for an 8.5 hour flight to SDF following a 33 hour layover. The scheduled flight duty period is 10 hours. The inbound aircraft arrives 3 hours and 15 minutes late in CGN, and the outbound crew is notified of their delayed departure prior to report time. The new report time is 0145 local.

a. Is the outbound crew now acclimated to CGN due to the extension of their layover making the layover more than 36 hours?

b. Does contacting the outbound crew prior to report time affect the scenario? If so, how?

c. Is the outbound crew legal to operate the return flight to SDF (scheduled flight duty period is 10 hours)?

Acclimated Station	Original Maximum Flight Duty Period (Hours)	Revised Maximum Flight Duty Period (Hours)
SDF	11.5	10.5
CGN		9

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United Parcel Service Co.

Noel J. Francisco

November 15, 2010

Exhibit 1

United States Department of Transportation
Federal Aviation Administration

In the matter of	)	
	)	Docket No.: FAA-2009-1093
Flightcrew Member Duty and Rest Requirements Proposed Rule	)	

DECLARATION OF PROFESSOR DONALD B. RUBIN CONCERNING THE FAA'S STATISTICAL ANALYSIS

Introduction

1. My name is Donald B. Rubin. I am currently the John L. Loeb Professor of Statistics, Department of Statistics, Harvard University. I have served twice as Chair of the Department, from 1985–1994 and also from 2000–2004.

2. I have been retained by United Parcel Service Co. (UPS) to evaluate independently the FAA's use of statistics to assess their proposal to replace the existing regulatory regime on flight crew member duty and rest with a set of new requirements.

3. To conduct this independent evaluation, I first familiarized myself with the Notice of Proposed Rulemaking in this docket (NPRM), the Regulatory Impact Analysis (RIA), and other materials in the public domain. My opinions are based on my own experience in the field of statistics and my review of those materials.

4. I have reviewed the statistical analysis contained in the FAA's RIA. Based on my professional judgment and decades of experience in the field of statistical analysis, for the reasons described below, the FAA's methodology was not statistically valid, and consequently their prediction is entirely unreliable. It, in essence, is no better than a

wild guess based on no data analysis.

The General Role of Statistics in Complex Public Policy problems

5. Before describing my qualifications in detail, it is important to describe briefly the role of the field of statistics in complex regulatory matters, such as the FAA's attempt to address pilot fatigue through a series of prescriptive regulations on pilot flight, duty and rest requirements. As is clear from the documents that the agency has produced, the relationship between fatigue and accidents is poorly understood, because *pilot error* is what actually leads to so-called "fatigue-related" accidents. The lack of definitive scientific understanding of causation in a case like this makes rigorous statistical analysis absolutely essential.

6. The field of formal statistics, and within it the sub-field of causal inference, has become important to policy-makers and regulators in recent decades, especially with the advent of modern computational tools. The field of statistics is designed explicitly to deal with events that are difficult to predict easily from basic scientific knowledge. For example, it is easy to predict what will happen to someone who drinks a pint of arsenic, to explain the resulting death, and to conduct an effective intervention, by prohibiting the consumption of arsenic. But it is far less easy to predict which of two anti-hypertensive drugs will have the more beneficial effect in a population of people over 50 years old with high blood pressure; not only are the results on which is better at lowering blood pressure important, but the possible negative and unanticipated side effects of the drugs can be critical. Continuing with this example, one of the drugs under study may be more effective at reducing blood pressure, but it may also lead to more fatal heart attacks for unanticipated reasons. "Drugs that lower blood pressure tend to work well. But they do not necessarily attack the cause of the problem. And no matter how safe they are, all drugs have some unwanted or unintended side

effects." *Harvard Heart Letter* (vol 21, #2, Oct 2010).

7. The example just cited illustrates why, in many areas of scientific inquiry, the field of statistics is not only relevant but critical to choices that regulators must make. As a result, when evaluating new drugs, the U.S. Food and Drug Administration essentially always relies on rigorous statistical analysis in the process of approving them.

8. In these situations with scientific uncertainty, a properly constructed formal statistical design and analysis can provide the best available scientific information to support a policy choice, a governmental approval or permit, or a rulemaking intervention. In my professional judgment, the failure to apply statistics correctly in such a context results in a decision that is speculative and without a firm scientific foundation. Therefore, the failure to use correct, formal statistical analysis in such a case raises serious questions about the wisdom of the rulemaking process itself.

9. The FAA appears to endorse this position: "the FAA uses 'scientific principles' to refer to knowledge, based on the scientific method, such as that established in the fields of physics, chemistry, and engineering…. A probability of failure estimate that is statistically and probabilistically valid should at least be the result of sound application of mathematics. A sound application of mathematics uses correct premises and makes only conclusions that are properly derived from those premises."[1]

10. Furthermore, an improper analysis could yield a flawed regulation that creates *more* safety risk than currently exists, just as with unintended side effects of drugs. Continuing with the drug pressure example, suppose that some patients suffering from

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[1] Federal Aviation Administration, *Probability of Failure Analysis for New Expendable Launch Vehicles*, Version 1.0 at 4. http://www.faa.gov/about/office_org/headquarters_offices/ast/media/Guide_Probability_Failure_110205.pdf

hypertension have a history of poor compliance with instructions for the use of pharmaceuticals prescribed to them -- they go on “drug holidays,” *i.e.*, stop taking their medications over weekends and on holidays. For these individuals, the use of beta blockers can be very dangerous because it can lead to vastly higher blood pressures than if no drugs were taken, and thus even to some fatal strokes. Therefore, a recommendation to physicians suggesting that they prescribe such drugs to all hypertensive patients, without considering this group of individuals, could result in untoward outcomes.

11. For another example, hormone replacement therapy (HRT) used to be a standard treatment for women with hot flashes and other menopause symptoms. HRT was widely prescribed because it was also believed to have the long-term benefit of preventing heart disease. Unfortunately, this belief was based on early, poorly designed and analyzed epidemiological studies. This view changed in 2002, when a large, carefully designed and analyzed, randomized clinical trial[2] showed essentially the opposite -- that the treatment actually posed greater coronary health risks than benefits for postmenopausal women. As a result, millions of women had been taking hormone replacement therapy drugs based on an improper statistical assessment of the associated risks.

Professional Qualifications

12. I have been involved in the formal field of statistics, studying issues of estimating the causal effects of interventions and consulting on applications of those concepts since I graduated from Princeton University in 1965. My formal training in statistics was at

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[2] The trial, under the auspices of the Women's Health Initiative of the National Institutes of Health, revealed that those receiving the treatment in the main part of their study had a higher incidence of, heart attacks and strokes. Writing Group for the Women's Health Initiative Investigators, Risks and Benefits of Estrogen Plus Progestin in Healthy Postmenopausal Women ., *JAMA.* 2002;288:321-333

Harvard University where I received my PhD in 1970.

13. I have authored or coauthored over 350 publications, including ten books, on statistics and its applications. I have served as Associate Editor for the Journal of Educational Statistics (1976–1979), and for Theory and Methods, The Journal of the American Statistical Association (1975–1979); I also served as Coordinating Editor and Applications Editor, The Journal of the American Statistical Association (1980–1982), and as associate editor for Biometrika (1992–1995), Survey Methodology (1988–1993), and Statistica Sinica (1993-2004).

14. I believe my work has made significant contributions to statistical theory and methodology -- particularly in the areas of causal inference, including the design and the analysis of experiments, observational studies and sample surveys; the handling of missing data, and Bayesian data analysis, which is a method of statistical inference in which certain kinds of evidence or observations are used to calculate probability distributions for unknowns given observed data. My work is also among the most cited of any statistician in the world. I am gratified that I am regarded in many fields where statistical analysis is crucial (such as medicine, pharmacology, education, psychology, and economics) as one of the leading authors and consultants on the topic of causal inference.

15. I am also privileged to have received repeated recognition for my work. Among other awards, I have received the Samuel S. Wilks Medal (American Statistical Association, 1995), the Parzen Prize for Statistical Innovation (1996), the Fisher Lectureship (2004), and the George W. Snedecor Award of the Committee of Presidents of Statistical Societies (2007). I have been elected as a Fellow of the American Statistical Association (1977), the Institute of Mathematical Statistics (1977), the

International Statistical Institute (1984), the American Association for the Advancement of Science (1984), , the Guggenheim Foundation (1977), the Woodrow Wilson Foundation (1965), and the American Academy of Arts and Sciences (1993); more recently, I was elected an Honorary Member of the European Association of Methodology (2008), was awarded an Alexander von Humboldt Foundation (2009) research award, elected a Corresponding (foreign) Fellow of the British Academy (2009), and elected a member of the U.S. National Academy of Sciences (2010).

16. I have taught courses on causal inference in randomized experiments and observational studies in the departments of statistics at Princeton University, the University of Wisconsin, the University of Chicago, and at Harvard University in the departments of Statistics, Economics and Psychology, for over two decades. Moreover, I have given short courses and lectures on such methods on five continents for universities, professional associations, governmental agencies, and businesses over a period of four decades, most recently at the British Academy in London, England (12 October 2010) and at the U.S. Food and Drug Administration (FDA in Rockville MD) (20 October 2010).

17. As part of my work, I regularly organize or co-organize meetings, panels, and workshops on the correct analysis of observational and experimental data for causal effects, and I have done so for over four decades. Currently, I am helping to organize a panel session at the annual Joint Statistical Meetings in the summer of 2011, which will entail five panel members, including me, a medical doctor from a pharmaceutical company, a senior statistician from the Centers for Disease Control (CDC) in Atlanta, a senior statistician from the FDA, and a former Commissioner of the FDA. All of these individuals have relied on my counsel, either directly as a consultant, or

indirectly through my publications, on the correct analysis of observational or experimental data for causal effects.

Prior Work for U.S. Federal Agencies

18. As a result of my expertise, I have taught or consulted with both the CDC and the FDA on the proper methodology for assessing treatments for diseases, including rare diseases and conditions, and the relative effectiveness of various drugs and therapies for their treatment.

19. I have advised many other US Federal agencies on issues concerning the proper design and analysis of observational and experimental data, as well as other statistical issues. Among these agencies are: The National Highway Traffic Safety Administration within the Department of Transportation, which consulted me on the topic of missing Blood Alcohol Content in the Fatal Accident Reporting System[3]; the Department of Defense, which asked me to study their induction exams and more recently, deception detection (i.e., “lie detectors”); the Department of Labor, for whom I did analyses related to problems of missing data in their Consumer Expenditure Survey; the Census Bureau, which involved me in numerous projects over a period of many years; the Internal Revenue Service, which also involved me in many projects, some on missing data, others on data base construction; and the U.S. Postal Service in a project that involved preparing a simulation model to support testimony before the Postal Rate Commission.

Prior Work for Foreign Governments

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[3] See: *Technical Report: Multiple Imputation of Missing Blood Alcohol Concentration (BAC) values in FARS.*, DOT HS 808 816. (1998) & *Transitioning to Multiple Imputation – A NewMethod to Impute Missing Blood Alcohol Concentration (BAC) values in FARS*, DOT HS 809 403., (2002)

20. I have also consulted for foreign governments on statistical issues. One recent project was for the German Bundesagentur für Arbeit, the Federal Agency for Employment, who sought to evaluate their job-training programs, on which they expend billions of Euros a year, from the data that they regularly collect on the unemployed. This project provides a particularly interesting comparison to the FAA's use of data in the RIA in support of its proposal to change regulations affecting pilot duty.

21. Individuals who are unemployed and collecting unemployment benefits often seek to enroll in job-training courses. These unemployed individuals have experienced varying and diverse episodes of employment, unemployment, training of some type and some duration, and so forth. From data on many millions of such episodes for millions of individuals, the desire is to estimate the effect, on employment and salary outcomes, of different kinds of job training programs, and to target the best programs for individuals depending on their age, sex, previous employment and job-training history, etc. This is a complex problem in causal inference, which demands the proper use of statistics. There is no scientific consensus about the correct answer, nor any definitive understanding of possible negative side effects of the job-training interventions. These might include "lock out" effects, where anticipated extensive training can lead individuals to postpone their job searches, and so actually delay or worsen their short-term employment prospects; or elevated self-perceptions among those who receive training, thereby increasing their "reservation wages", which may lead them to refuse to take lower paying jobs that they would have taken if not trained.

22. The evaluation that I designed with German collaborators predicted the effectiveness of job training by carefully examining the differing factors that might cause such training to work well in some situations and poorly in others. The plan has been implemented, and I am told it is being currently used with success. In this German

project, our methodology was accepted by all stakeholders affected by the policy decision, partly because we involved all of them in the plans for the statistical design of the study before seeing the answers.[4] This feature is critically important, as I have argued recently in several publications.[5]

23. There are similarities between the employment policy issues the German authorities sought to address and the issue of pilot fatigue the FAA seeks to address. Like unemployment and possible countermeasures, there are various forces at work that may create or may mitigate fatigue among flight crews. As in the case of German employment policy, there is no scientific consensus regarding the effects, including untoward negative side effects, of the proposed FAA intervention. Thus, in the FAA context, proper statistical analysis of all reasonable data on the episodes of pilots' flights must be used to estimate the effect of the proposed change (or intervention). The failure to do so, as I explain below, makes the FAA analysis, at least to date, entirely inadequate.

The Rubin Causal Model and Its Use in Evaluating Policy Options

24. Decisions in medicine, public health, and social policy depend critically on appropriate evaluation of competing treatments, interventions and policies. The proper evaluation of empirical information about such comparisons, which is called causal inference, has been a growing area of statistical research in recent years, especially in the context of observational (non randomized) studies, or randomized studies with

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[4] Projekt Wirkungsanalyse – TrEffeR-- Bundesagentur für Arbeit (Evaluation of Active Labor Market Policy—TrEffeR--German Federal Employment Agency) (2008)

[5] "The Design Versus the Analysis of Observational Studies for Causal Effects: Parallels with The Design of Randomized Trials." Statistics in Medicine, (2006) 26, 1, pp. 20-30. & "For Objective Causal Inference, Design Trumps Analysis." The Annals of Applied Statistics, (2008) 2, 3, pp. 808 – 840 & "Outcome-free Design of Observational Studies with Application to Investigating Peer Effects on College Freshman Smoking Behaviors." Les Annales d'Economie et de Statistique, (2010) 91, pp. 107-125. (With S. Langenskiöld.)

complications created when the units being studied are humans (e.g., complications such as noncompliance with assigned treatments, or ethical considerations that prohibit certain kinds of experiments, such as randomly depriving pilots of sleep, then allowing them to fly and observing the consequences). A statistical framework for causal inference that has received increasing attention is the one based on potential outcomes; these were originally introduced by Neyman (1923)[6], in the context of randomized experiments and randomization-based inference. My framework incorporated, generalized, and extended the use of potential outcomes to nonrandomized studies and alternative forms of inference, starting with Rubin (1974).[7]

25. Fundamentally, in this framework, which is often called the Rubin Causal Model (Holland, 1986)[8], a unit (e.g., a patient) is considered at a particular place and time; treatments are interventions, each of which can be potentially applied to each unit; and potential outcomes are all the outcomes that would be observed if each of the treatments could be applied to each of the units. Then a causal comparison between, say, two treatments is a comparison of the potential outcomes of the same group of units under the two treatment conditions.

26. I believe the Rubin Causal Model is now the most commonly accepted framework for causal inference. (One can "Google" it and find over 80,000 hits.) Specific

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[6] See: "Comment: Neyman (1923) and Causal Inference in Experiments and Observational Studies." Statistical Science, (republished in English-1990) 5, 4, pp. 472-480.

[7] "Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies." Journal of Educational Psychology, (1974) 66, 5, pp. 688-701.

[8] Holland, P. (1986). Statistics and causal inference. Journal of the American Statistical Association, 81(396):945–960.

techniques for use within this framework that I have either developed or co-developed include: propensity score methods[9], principal stratification,[10] and various forms of matching methods, such as Mahalanobis metric matching.[11] As I will explain, it appears to me that the FAA did not use any of these methods, or acceptable alternatives, in the analysis it conducted.

Causal Inference Analysis and Aviation Safety Regulation

27. Aviation safety is no exception to the principle that a statistically valid causal framework must be used when the other bases for scientific understanding of causes are uncertain (or nonexistent). This conclusion is true even though sound scientific information may be available for other kinds of aviation regulatory interventions. The point is that the need for statistics depends on the particular question one is addressing.

28. For example, on November 9, 2010, the FAA issued Airworthiness Directive 2010-

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[9] In the design of experiments, a propensity score is the probability of a unit (e.g., person, classroom, school) being assigned to a particular condition in a study given a set of known covariates. Propensity scores are used to reduce selection bias by creating similar groups based on these covariates. Paul Rosenbaum and I introduced the propensity score in 1983, to provide an alternative method for helping to estimate treatment effects when treatment assignment is not formally randomized, but can be assumed to be unconfounded. “The Central Role of the Propensity Score in Observational Studies for Causal Effects.” Biometrika, (1983) 70, pp. 41-55. (With P. Rosenbaum).

[10] Many scientific problems require that treatment comparisons be adjusted for post-treatment variables, but the quantities being estimated by standard methods of adjusting for such variables are not causal effects in general, but only in special cases. To address this deficiency, I developed, with Constantine Frangakis, a general framework for comparing treatments adjusting for post-treatment variables that yields principal effects based on principal stratification. Principal stratification with respect to a post-treatment variable is a cross-classification of subjects defined by the joint potential values of that post-treatment variable under each of the treatments being compared. “Principal Stratification in Causal Inference.” Biometrics, (2002) 58, 1. pp. 21-29. (With C. Frangakis).

[11] In statistics, the Mahalanobis metric refers to a distance measure introduced by P. C. Mahalanobis in 1936. It is a method that incorporates correlations between variables. It is the same as Euclidean distance if the variables are uncorrelated, and it is also a scale-invariant method , i.e., not dependent on the scale of measurements.

23-16 applicable to Embraer EMB-500 airplanes. I understand that the FAA issued the document because it became aware of a very specific triggering problem: "occurrences of failure of the Flow Control Shutoff Valve (FCSOV) in the closed position. Failure of the two valves (left and right) can cause the loss of the pneumatic source, and lead to loss of the cabin pressurization." I also understand that the solution was equally well understood: replacement of the FCSOV with a "new and improved" FCSOV. *Id.* at 2. In this example, the relationships between risk, failure modes, chains of causes and solutions seem to be well understood, because it is a relatively simple, closed system. The use of a formal statistical causal model in this situation would not add to our understanding of the problem and thus not lead to a better solution.

29. Another example appears to come from the FAA's extensive work in the area of prevention of aircraft fuel tank explosions, which culminated in its Final Rule on the Reduction of Fuel Tank Flammability in Transport Category Airplanes, issued on July 21, 2008. I understand that, in the NPRM, the agency was able to isolate the necessary conditions for an explosion of aircraft fuel tanks to three: 1) an ignition source, 2) combustible fuel, and 3) the minimum oxygen/nitrogen ratio in the ullage of the tank. 70 Fed. Reg. 70,925 (Nov. 23, 2005) In absence of any of these conditions, I am told that there could be no explosion of this sort.

30. In the fuel-tank rule, I understand that the FAA required airline operators to adopt "inerting" technologies to address the third condition; the agency apparently knew, based on core science of physics and chemistry, that these technologies would prevent

an explosion. Thus, it did not need to employ the causal model described earlier to predict the effectiveness of the rule. By eliminating one of the three conditions, it rendered the other two harmless. The agency deliberately targeted the oxygen/nitrogen ratio as the condition to eliminate. Obviously fuel was not a candidate for elimination from the fuel tank. However, I understand that the FAA did consider whether ignition sources could be eliminated. Because of the vast diversity of airplane types, sub-types, configurations, wear of individual components, human error in performing maintenance, and so forth, the FAA apparently concluded it was "unlikely to identify and eradicate all possible sources of ignition." 73 Fed. Reg. 42,446 (Jul. 21, 2008).

31. Studies involving human factors in aviation fall into a different category because the relationship between fatigue, human error, and airplane accidents is complex. For example, in terms of sleep and fatigue, the FAA states in the current docket that "sleep science has not been validated in the aviation context." (Docket No. FAA-2009-1093; Notice No. 10-11RIN 2120-AJ58, p. 39) Indeed, the scientific research indicates a great deal of uncertainty about the physiological and other conditions that may induce fatigue and harm performance in flight. Thus, in such a situation, formal statistical, causal inference analysis provides the only, and thus the best, available scientific information upon which to make a decision.

32. According to the DOT *Guide to Good Statistical Practice in the Transportation Field,* "[a]ll statistical methods used should be justifiable by statistical derivation or reference to statistical literature. The analysis should also include an examination of

the probability that statistical assumptions will be violated to various degrees, and the effect of such violations would have on the conclusions." *Id.* My review of the FAA analysis indicates that these steps were not taken.

33. It would appear that a great deal of recent outcome data and covariate data was available to the FAA for the purpose of conducting more complete statistical analysis but evidently not used.

34. Data from the Line Operations Safety Audit (LOSA) program, which seems particularly well-suited for the type of analysis that the FAA should have done, was one obvious source. According to FAA Advisory Circular 120-90, "LOSA observers record contextual and flight crew data on every phase of flight, regardless of the outcome. All three perspectives provide useful data to an airline's safety management system." It is my understanding that this program has proven so effective as a means to improve aviation safety that it has since been adopted and promoted by the International Civil Aviation Organization which states in Document 9803: "It is suggested that understanding the human contribution to successes and failures in aviation can be better achieved by monitoring normal operations, rather than accidents and incidents. The Line Operations Safety Audit (LOSA) is the vehicle endorsed by ICAO to monitor normal operations" at 1-2. A statistical analysis that looks only at data from accidents is invalid in general.

35. LOSA appears to be one of a vast number of data sources relevant to safety available to the FAA. I understand that the FAA collects relevant data on flight operations

from the Aviation Safety Information Analysis and Sharing (ASIAS) system, which is fed by 46 sources of data consisting of automated machine reports and subjective human reporting. I understand there are plans to expand the input sources to 64 databases. Through ASIAS, FAA appears to have actual data from 30 airlines representing 80 percent of commercial operations in the U.S.[12]

36. I also understand that the FAA collects a great deal of information about near-accidents, in the sense that it gathers voluntary reports from pilots of errors through the Aviation Safety Action Program (ASAP). The ASAP also collects reports of safety issues from other employees of airlines such as mechanics. . Although the voluntary nature of this data may be problematic, it would seem that in a human factors analysis, one would want to include such information in the database because it could help assess whether the presence (or absence) of various factors that lead to pilot error are also present in cases of supposed fatigue-related accidents.

37. My review of the FAA's analysis leads me to believe none of these data sets were used when preparing its analysis. Given the abundance and quality of data apparently at its disposal, the FAA's choice of analytical method is extremely puzzling because it violates even the FAA's best practice for the conduct of such analyses as expressed in their supported research for the LOSA program mentioned above: "An understanding

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[12] Fact Sheet – Aviation Safety Information Analysis and Sharing (ASIAS) System, June 15, 2010. http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=11497

of flight safety can only be gained from valid, empirical data from normal operations."[13]

What the FAA Should Have Done But Neglected To Do

38. By looking at past data, and the accidents that occurred in the actual (or factual world), the FAA's objective was to estimate what would have happened in the counterfactual world with the proposed regulations in place. In other words, the goal was to estimate what would have happened in the past but for the past's "lax" regulation in terms of accident/incident outcomes, and then to forecast the future accident and/ or incident rate under the new proposed regulatory regime. The difference between the outcomes in the actual and the counterfactual world is the estimated "effectiveness" of the new regulatory regime in the past. This is obviously a crucial part of the FAA's overall cost-benefit analysis.

39. However, the FAA analysis only examined accidents that occurred. It made absolutely no effort to characterize the difference between those flight segments and the millions of flight segments without accidents or incidents, nor between the latter ones and the thousands of flight segments with self-reported pilot errors. In my view, the analysis was thus entirely unable to address the question presented about the consequences of implementing the proposed regulation, even in the past.

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[13] Helmreich, R.L., Klinect, J.R., and Wilhelm, J.A., *System Safety and Threat Error Management: The Line Operational Safety Audit (LOSA).*, (2001).

40. To document the problem with the FAA's analysis given these objectives, I describe below the outline of the observational study that *should* have been conducted to estimate the causal effect of the proposed regulations had they been implemented in the past.

41. For convenience, I call the actual past world without the intervention of the new FAA regulation, the "control condition," and the counterfactual world with the FAA's new requirements, the "treatment" condition. This terminology comes from social science and medical worlds, where, for example, the control condition refers to the current standard of medical care, and the treatment refers to the use of a new drug. The description that I provide below is consistent with roughly a hundred articles that I have written on this topic[14], most recently by me in a discussion of an article on comparative effectiveness research.[15]

42. One begins by identifying a relevant data source, or a combination of data sources. By relevant, I mean ones that have critical pieces of information. In our context, there are several:

- First, data on past flight segments that will enable one to determine whether each segment would have been allowed under the new regulations or not. If it would have been allowed, it is a control segment; if it would not have been allowed, it is a treatment segment.

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[14] I have contributed on this topic for about 45 years; some of this work is summarized in the book Rubin (2004, Matched Sampling for Causal Inference)

[15] - "On the Limitations of Comparative Effectiveness Research." *Statist. Med. 2010,* 29 1991-1995,

- Second, outcome data, meaning safety data from these past segments, including accidents, incidents, and self-reported pilot errors.
- Third, background information data, called "covariate" data; these are factors that could influence flight safety, such as the year of the flight, meteorological conditions, the ages of the pilots, the level and type of experience of the pilots, the type of aircraft, the individual carrier's flight procedures and training programs, the planned duration of the flight, and other factors such as the pilots' commuting times. In fact, the Department of Transportation clearly recommends inclusion of such data when performing causal analysis: "Besides data that are directly related to strategic plans, additional data may be required for possible cause and effect analysis. For example, data collected for traffic crashes may include weather data for causal analysis."[16] The best data set on past flight segments including accidents/incidents and covariate data would be found or created from whatever sources are available.

43. Next, the outcome data are removed from that data base, and held in a secure place for future analysis[17].

44. When that is done, for each treated segment, we find a control segment that matches it with respect to the covariate data. Indeed the FAA's *Guide to Probability of Failure*

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[16] *Guide to Good Statistical Practice in the Transportation Field*, Updated May 2003 (page 2-5)

[17] This step is critical to a fully objective causal analysis. Moreover, it has been implemented in real world observational studies. For a very recent example, consider the study of how many embryos to implant in in vitro fertilizations being conducted at the Division of Reproductive Health at the CDC and described in an ongoing PhD thesis at Harvard University; also consider the article by Langenskiöld and Rubin (2010) on peer effects on smoking behaviors, "Outcome-free Design of Observational Studies with Application to Investigating Peer Effects on College Freshman Smoking Behaviors." Les Annales d'Economie et de Statistique, 91, pp. 107-125.

Analysis for New Expendable Launch Vehicles, Version 1.0 recognizes this need to find matches, “The following five factors may be considered as part of the determination of what constitutes all previous flights of vehicles developed and launched under similar circumstances…” Here, “similar” means “matching” in common statistical terminology. Although this particular task is not easy, it can be implemented in a period of months in my experience, and it should have been conducted by the FAA, particularly given the vast quantity of data that is apparently available to, or readily obtainable by, the agency.

45. Of course, how to implement this task for evaluation of the proposed intervention concerning pilot fatigue depends greatly on the specifics of the data set -- including how many flight segments there are, the ratio of treated flight segments to control flight segments, the number of covariates, the overlap in the distribution of covariates between treated and control segments, how investigators decide to trade off certain background factors versus other background factors, and so forth. Together with my students and former students, I have written extensively on the specifics of how to do this step in a recently published book, which summarizes some of this literature. (See footnote 13)

46. Next, one writes a protocol describing, as exactly as possible, how the outcome data will be analyzed, once they are made available. This process begins by carefully defining the quantities to be estimated, known as the “estimands.” Flights that are more recent in time are more relevant than flights that took place years ago. The way this issue is to be addressed depends upon the number of treated and control flights in

the very recent past. This general task of defining estimands and identifying the correct analysis plan to estimate them are critically important topics. Fortunately, current computational advances have made available many new and superior techniques for this task, but it is impossible to be much more specific without having access to the data sets that would be used to accomplish this task.

47. Once the protocol is written, one would bring back the outcome data, and append it to the data set of treated units and matched control units with respect to the covariate data. Then one would analyze the result according to the protocol, for example, by estimating accident/incident rates for the treated flights and for their matching control flights. If the rates are similar for the treated and matched control flights, there is no empirical evidence that the proposed regulations will have any effect on flight safety. If the rates are lower in the treated flights than in the matched control flights, then there is evidence that the regulations would have eliminated safer flights, i.e., that there are negative side effects of the proposed regulations; see the discussion below for some possibilities. Only if the accident/incident rate is significantly higher in the treated flights will there be a need to do a further cost-benefit analysis.

48. In addition, if the proposed regulations have a positive safety effect, then one must compare the accident rate in the treated flights to the accident rate in all the control flights (matched and unmatched). Unless the accident rate is significantly larger for the treated flights (i.e., the difference between them is statistically significant at some level), then one must conclude that FAA rule would be no more effective than a random rule. The classic example of such a rule in this context would be: “Randomly

choose flights to forbid from taking off because this will reduce total accidents." To be sensible, a regulation with significant financial consequences must perform substantially better than such a random rule. The analysis described in this paragraph is not a causal one but a descriptive one, and seems to be similar to what the FAA had in mind.

49. There could be reasons to believe that the intervention might perform worse than a random rule because of unintended consequences, but, of course, we do not know that without doing the correct analysis.

    a. For example, the FAA proposal may increase the risk of accidents among carriers by limiting pilots to three consecutive night flights, thereby forcing an increase in the number of 'first night' exposures, which may be the most taxing flights and thus more fatigue inducing
    b. Another example of how the proposal may diminish safety margins is its re-categorization of administrative activities of management pilots as "duty", thereby reducing the total time they are available to fly and thus making it more difficult for them to maintain their flight proficiency.
    c. A final example concerns the agency's proposal to limit the length of flight duty periods (FDP) based on the number of flight legs or segments. It is my understanding the FAA and NASA have found that boredom and the monotony of tasks resulting from extensive aircraft automation may contribute to fatigue. If the FAA had concluded that cockpit automation led to fatigue in the same way it is now considering factors such as number of legs, it could have

proposed a rule that would forbid future use of automation technology in airplanes.[18]

Conclusion

50. The FAA is trying to evaluate the effectiveness of a proposed intervention that changes regulations on pilot working hours and rest time. I support this objective.
51. But in so doing, the *proper* use of statistical techniques was critical given the uncertainty about the consequences of the proposed intervention, both anticipated and unanticipated.
52. I have examined FAA's methodology to see whether it is correctly designed to produce a statistically valid prediction of the effectiveness of the proposed regulation. Based on my experience, the answer in my professional opinion is, absolutely not.

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[18] See generally: Strauss, S., *Pilot Fatigue.*, http://aeromedical.org/Articles/Pilot_Fatigue.html &

Weitzel, T.R., & Geraci, J.A., *The Construct of Fatigue: A Model for Aviation*. https://hfskyway.faa.gov/(A(Lth2wzpEywEkAAAAMDExYTU2ZGItMGQ4YS00NjViLWFkOGEtMGE2Y2JlMzA3NTdht4RiDm1ayyGq7npl13dHGb5cu4I1))/HFTest/Bibliography%20of%20Publications%5CHuman%20Factor%20Maintenance%5CThe%20Construct%20of%20Fatigue%20%20A%20Model%20for%20Aviation.pdf

Ahlstrom, V. Longo K., Truitt, T. *Human Factors Design Guide Update (Report Number DOT/FAA/CT-96/01): A Revision to Chapter 5 -- Automation Guidelines.* (2002). http://www.hf.faa.gov/docs/508/docs/hfdg_ch_5_update.pdf

November 15, 2010

I declare under penalty of perjury that, to the best of knowledge and belief, the foregoing is true and correct.

Signed: ______________________________

Donald B. Rubin

Exhibit 2

Exhibit 3

Statement of David Parrott
Concerning the Economic Impact of the NPRM on UPS

1. My name is David Parrott. I am over 18 years of age, of sound mind, and capable of making this declaration. Based on information and belief, the facts stated in this declaration are true and correct.

2. I have been employed by United Parcel Service, Inc. ("UPS") for 18 years. I am currently the Finance & Accounting Flight District Manager for the company, in which capacity I am responsible for Financial Reports, Plans, and Analysis related to UPS's Flight Operations. For purposes of this declaration, when I refer to "UPSCO," I mean the air carrier that operates under FAA certificate authority pursuant to Part 121 of the Federal Aviation Regulations. When I refer to "UPS," I mean the corporation as a whole, United Parcel Service, Inc.

3. I coordinated the effort to gather the information required for UPS to provide meaningful comments on the economic impact to UPS of the Proposal. This declaration is based on my review of the collective work of several UPS employees who are personally knowledgeable about the operational areas impacted by the Federal Aviation Administration's ("FAA") Flightcrew Member Duty and Rest Requirements Notice of Proposed Rulemaking ("Rule" or "Proposal"). The results of this collective analysis are set out herein.

4. On September 14, 2010, the FAA published the Proposal. The Proposal represents a significant change from the long-established regulatory regime applicable scheduled all-cargo operators.

5. In connection with the Rule, the FAA conducted a Regulatory Impact Analysis ("RIA") that purports to estimate the costs and benefits of the Rule. The RIA is clearly inaccurate, because it omits certain costs that the Rule would impose on UPS, while it greatly underestimates other costs to UPS.

6. On September 27, 2010, UPS submitted to the FAA a request for a 60-day extension to the comment period. My understanding is that several other similar requests were made by various interested parties and that on October 15, 2010, the FAA denied all comment period extension requests.

7. Due to the very short timeframe the FAA has permitted to respond to this Proposal, UPS has had to make a number of assumptions, discussed below, when calculating the economic impact of the Proposal on UPSCO's operations. UPS has nevertheless done its best under the circumstances to provide cost estimates that are accurate. Based on the assumptions, outlined below, and the time constraints imposed on us by the FAA, UPS provides herein an estimated cost impact range for each specified provision contained in the Rule. UPS reserves the right to supplement its cost estimates as more information becomes available.

UPS's Cost Estimate

8. As a result of many of the provisions contained in the Rule, UPS will incur substantial additional operating costs that the RIA either greatly underestimates or altogether fails to consider.

9. Section 117.9 of the Rule requires Flight Duty Periods to conclude within their scheduled duration 95% of the time. This will impose substantial costs on UPS because, as a result of section 117.9, UPSCO will have to modify its flightcrew member schedule construction. UPS estimates that it will cost UPS between $435 million and $535 million dollars over a 10-year period to comply with section 117.9. These costs were calculated by identifying the number of duties that will require modification. Then, using a historical range of productivity, UPS calculated the number of additional flightcrew members required to maintain our current schedule.

10. Section 117.11 of the Rule requires certificate holders to provide a fatigue education and training program for all employees responsible for administering the provisions of this rule. This will impose substantial costs on UPS because, as a result of section 117.11, UPS will have to schedule initial and annual training for all affected employees. UPS estimates that it will cost UPS approximately $17.1 million over a 10-year period to comply with section 117.11. UPS calculated this cost by identifying the number of affected employees and determining the payroll impact for each employee to complete the required training.

11. Sections 117.15 and 117.19 of the Rule require certificate holders to implement new, lower flight duty period maxima and further reduce those limits for un-acclimated crewmembers. The Rule further requires that Flight Duty Periods may not be extended on consecutive days and not more than once in any 168 hour window. This will impose substantial costs on UPS because, as a result of sections 117.15 and 117.19, UPSCO will have to revise crew planning assignments to comply with the Rule and will have to increase its level of reserve pilot coverage in order to have crewmembers available to replace those whose Flight Duty Periods may not be extended per the Rule. UPS estimates that it will cost UPS between $401 and $553 million dollars over a 10-year period to comply with sections 117.15 and 117.19. These costs were calculated by identifying the number of duties that will require modification. Then, using a historical range of productivity, UPS calculated the number of additional flightcrew members required to maintain our current schedule.

12. Section 117.21 of the Rule requires more stringent limitations on our reserve pilot utilization rate. This will impose substantial costs on UPS because, as a result of section 117.21, UPSCO will lose some reserve pilot productivity, particularly for those crewmembers who work at night. UPS estimates that this will cost UPS between $152 million and $295 million over a 10-year period to comply with section 117.21. UPS calculated this cost by assuming that nighttime reserves would be unavailable to operate every fourth consecutive nighttime duty.

13. Section 117.23 of the Rule requires certificate holders to adhere to limitations on cumulative Flight Duty and cumulative Duty. This will impose substantial costs on UPS because, as a result of section 117.23, UPSCO will have to schedule less duty for our

flightcrew members. UPS estimates that this will cost UPS between $21 million and $26 million dollars over ten years to comply with section 117.23. This cost was calculated by identifying the number of duties that will require modification. Then, using a historical range of productivity, UPS calculated the number of additional flightcrew members required to maintain our current schedule.

14. Section 117.25 of the Rule requires that certificate holders schedule longer minimum rest periods than are required today. This will impose substantial costs on UPS because, as a result of section 117.25, reserve crewmembers will be less efficiently utilized, which will result in more unusable reserve days. UPS estimates that this will cost UPS between $43 million and $80 million dollars over a 10-year period to comply with section 117.25. This cost was calculated by calculating the historical rate of reserve pilot usage and was adjusted to allow for rest following international trips including more than 168:00 hours away from base.

15. Section 117.27 of the Rule imposes a limit on the number of consecutive nighttime operations. This will impose substantial costs on UPS because, as a result of section 117.27, UPS will have reduced flightcrew member productivity. UPS estimates that it will cost UPS between $63 million and $74 million dollars over a 10-year period to comply with section 117.27. This cost was calculated by identifying the number of scheduled crewmembers that would be unavailable for duty on a fourth consecutive night and applying a historical productivity factor to estimate additional crewmembers needed to maintain the current schedule.

16. Carrying Costs: UPS will also incur substantial costs because, as a result of the Rule, UPS will have to staff flightcrew members well in advance of the implementation of the new rule in order to have on hand enough qualified crewmembers for the increased requirements of the Rule, when it takes effect. As a result, UPS will have to bid new positions and begin training crewmembers at least two years before the rule is implemented in order to meet the additional requirements. UPS estimates that this will cost UPS between $24 and $36 million dollars in the first two years. This was calculated using our standard training rate associated with bidding new crew positions, and it reflects the time required to complete initial training.

17. Technology Costs: UPS will also incur substantial costs because, as a result of the Rule, UPS will have to modify and/or purchase crew tracking information technology systems used to manage pilot flight, duty, and rest time periods. UPS estimates that these implementation costs will be between $5 million and $8 million. This is an estimate of the labor involved in the analysis, coding and testing days associated with the proposed rule changes, and UPS used historical cost data for those work days.

18. Aircraft rest facilities: UPS will also incur substantial costs because, as a result of the Rule, UPS will have to modify a portion of our B767 fleet in order to augment crews on this fleet type. UPS estimates that these modification costs will be approximately $185 million dollars over a 10-year period. This cost includes two components: 1) the amount of revenue that UPS could expect to lose due to the loss of the forward container position on routes requiring augmentation; and 2) the expected cost of reconfiguring our fleet of

59 B767s (39 currently in service and 20 more on order), which UPS estimates to be approximately $250,000 per airplane, plus UPS's estimated costs of acquiring unit load devices, which UPS estimates to be approximately $10 million dollars.

19. As explained in UPS's comments and the declarations attached thereto, as well as in comments submitted by the ATA and CAA, these and other aspects of the proposed Rule impose enormous burdens on UPS's ability to operate its all-cargo airline service.

20. The cost estimates described in the preceding paragraphs are summarized in the table below:

REGULATION	**Est. 10 Yr. Compliance Cost–Low**	**Est. 10 Yr Compliance Cost–High**
Schedule Reliability Costs (117.9)	**$435,425,310**	**$535,687,717**
Fatigue Training (117.11)	**$17,107,560**	**$17,107,560**
Flight Duty Period Limitations and FDP Extensions (117.15 and 117.19)	**$401,049,628**	**$552,875,559**
Reserve Status (117.21)	**$151,825,931**	**$295,057,941**
Cumulative Duty (117.23)	**$20,911,873**	**$25,781,762**
Rest Periods (117.25)	**$42,969,603**	**$80,209,926**
Consecutive nighttime operations (117.27)	**$63,022,084**	**$74,480,645**
Implementation Crewmember Carrying Cost	**$22,466,250**	**$33,468,000**
Information Technology Infrastructure	**$5,000,000**	**$8,000,000**
Lost Revenue From and Installation Costs for Class 1 Rest Facility (117.3)	**$184,750,000**	**$184,750,000**
TOTAL	**$1,344,528,240**	**$1,807,419,110**
NET PRESENT VALUE TOTAL	**$960,840,962**	**$1,290,123,595**

Assumptions Underlying UPS's Analysis

21. UPS's cost analysis is predicated on several reasonable assumptions, including the following:

(a) UPSCO will modify its B767 aircraft, which comprise 18% of UPSCO's total aircraft fleet, so that they have a qualifying on-board Class I rest facility. UPSCO currently uses B767 aircraft on segments exceeding the flight time limits in Table A—limits that are well below the aircraft's design capability. UPSCO's B767 aircraft do not have an on-board rest facility meeting any of the applicable definitions in the Proposal. Consequently, UPSCO would need to modify the B767 fleet in order to continue using the B767 on flights requiring augmentation;

(b) For the purposes of this analysis, all duties are considered to begin at home-base time and all international duties are considered to be non-acclimated. There are international segments of our network for which flightcrew members will become acclimated. Acclimated crewmembers will have shorter FDP maxima and there are more FDPs that would be defined as non-compliant. For this reason, UPS believes that the estimate provided in this document is conservative;

(c) Nighttime duties are defined in this analysis per the FAA's Response to Clarifying Questions, which FAA published in the Rulemaking docket on October 22, 2010. Under this assumption, UPSCO flights that are part of UPS's next day air service are not nighttime flights because they begin before 10:00 p.m.[1];

(d) The sample used for this analysis includes fourteen months of historical duties completed. These duties were redefined to comply with the Proposal's definition of "Flight Duty Periods" or "Duty." Approximately fifty percent of crewmembers' schedules were analyzed for non-compliance in the areas analyzed and a historical productivity rate was used to equate additional crewmembers that would be required to cover those non-compliant duties.

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[1] If the FAA changes the definition or interpretation of nighttime operation to one that includes any segment that operates between the hours 10:00 p.m. and 5:00 a.m., even if the first segment begins before 10:00 p.m., then UPS will incur an additional $11 million in annual expenses.

I declare under penalty of perjury that, to the best of my knowledge and belief, and subject to the qualifications and assumptions discussed above, the foregoing is true and correct.

David Parrott

David Parrott

Executed on November, 15 2010

TAB 19

DAVID A. BERG, ESQ.
Vice President & General Counsel
202-626-4234
dberg@airlines.org

September 14, 2011

Ms. Kristy Daphnis
Policy Analyst
Office of Management and Budget
725 17th Street, NW
Washington, DC 20503

Re: FAA Flightcrew Member Duty and Rest Requirements

Dear Ms. Daphnis:

This letter is a follow-up to our meeting regarding the above captioned final rule, which is now under review. The purpose of this letter is to address the job-loss implications of the rule as proposed. Previously, we focused on the rule's lack of demonstrated safety benefits, potential unintended safety consequences, operational concerns and unjustified costs. Our stellar safety record reflects our commitment to safety; unfortunately, this rule does not advance industry safety. It will, however, have severe negative effects on U.S. airline employment and U.S. global competitiveness while reducing service, especially to small communities.

As the attached Oliver Wyman analysis demonstrates, the proposed rule would cause between 11,900 and nearly 27,000 U.S. airline jobs to be lost. These approximately 26,700 direct airline and air cargo carrier job losses would result in total job losses to the economy of 398,000 jobs. This estimate, based on economic impact assumptions used by the FAA,[1] consists of: (1) direct commercial service job losses of 184,000 jobs, as a result of airline and air cargo job losses, related job reductions in aircraft manufacturing, airports, and supporting businesses; and (2) indirect commercial service job losses of 214,000 jobs, as a result of reduced spending by visitors at hotels, restaurants, and recreational activities.

Implementing a rule that will eliminate almost 400,000 jobs is staggering - - but is particularly troublesome at a time when unemployment persists above 9 percent and job creation is at the top

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[1] *See* The Economic Impact of Civil Aviation on the U.S. Economy, December 2009 and August 2011, Federal Aviation Administration.

of the agenda for President Obama and Congress. Furthermore, another rule under consideration by the Federal Aviation Administration will exacerbate the impact.[2]

The rule will drive job loss because airlines will not be able to raise prices sufficiently to meet the new costs that the rule imposes because of consumer price sensitivity. This situation will force airlines to cut capacity, in particular service to marginally profitable and unprofitable routes – many of them serving small and rural communities that depend on air transportation to connect to the rest of the country and world.

Reducing capacity and service means fewer employees. The attached analysis examines the impact in two different ways: The first is an aggregation and extrapolation based on individual airline estimates, and the second is a macro analysis that predicts industry capacity reductions based on past experience.

It also is worth noting that the competitive impacts of the rule apply with particular force to one segment of the industry: those airlines employing a so-called "ACMI" (aircraft, crew, maintenance and insurance) business model.

Atlas Air is an example of an ACMI carrier. Like a handful of U.S. airlines and many other foreign airlines, Atlas operates its own freighter aircraft on behalf of foreign airlines, such as UAE-headquartered Emirates, Belgium-headquartered TNT and Australia-headquartered Qantas; and large freight consolidators such as Swiss-headquartered Panalpina. Atlas is compensated for each hour of flying at a rate designed to recover its ACMI expenses, and the customers bear the marketing risk.

This is a classic example of in-sourcing – where foreign companies are reaching out to a U.S. company for services. If the proposed rule is finalized, Atlas will operate less efficiently and will need to consider price increases and other adjustments to its business model. As a consequence, foreign customers may decide to operate these services themselves, or to transfer the business to foreign airlines in Europe and Asia, which are subject to less stringent flight and duty time rules.

It is difficult to understand how a curtailment of this in-sourcing model would help the United States, especially at a time when unemployment is very high and the economic outlook is at best uncertain. According to data recently released by the Bureau of Transportation Statistics, major air carrier employment was essentially static between April 2010 and April 2011. While various airlines reported workforce increases, the largest percentage increase was that of Atlas, at 15.45 percent. If the proposed rule is finalized, it is virtually certain that this pace of employment growth will be unsustainable.

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[2] In addition, OMB currently is reviewing another FAA proposed rule to enhance minimum pilot qualifications, including an increase in the minimum number of flight hours a pilot must have to qualify for a commercial license (RIN: 2120-AJ67). The effect of these two rules will be to increase demand for pilots (this rule) while limiting the supply of pilots (enhanced minimum qualifications). The cost of this rule and its impact on jobs likely will be amplified because of the new qualifications rule.

As we have stated previously, the rule as proposed fails to meet the criteria for rulemaking laid out in Executive Orders 12886 and 13563. The adverse impact on employment in the U.S. airline industry is an additional reason to require the FAA to revise the rule and go through another round of notice-and-comment rulemaking. Thank you for considering our views.

Very truly yours,

D. A. Berg

David A. Berg

cc: Michael A. Fitzpatrick

Attachment

OLIVER WYMAN

September 2011

Estimated Job Loss Resulting from Flightcrew Member Duty and Rest Requirements

Two approaches to estimating the $19.6 billion 10-year cost of the rule[1] are provided below:

1. Aggregating individual carrier estimates; and

2. Using industry estimates of the impact of the estimated $1.96 billion annual cost increase incurred by mainline and cargo carriers.

In each case, airline job losses and total job losses to the U.S. economy, in part based on economic impact assumptions used by the FAA, are provided.

All job loss estimates are net numbers, which incorporate additional pilot hiring numbers that are more than fully offset by job losses among other employee categories.

I. Aggregating individual carrier estimates

Carriers making up more than 50% of both passenger and cargo carrier employees and block hours in 2010 provided estimated job losses resulting from the rule. The basic methodology used by the carriers was to estimate the cost of compliance with the rule, with a specific focus on the cost of requiring additional pilots to conduct the same amount of flying and on the operational impacts of the rule. This substantial increase in costs was estimated to lead to the elimination of marginal flights that no longer met individual airline minimum profitability thresholds. Overall employment reductions required to operate the reduced number of flights were then estimated.

The job losses estimated by individual mainline passenger carriers and air cargo carriers, which have been aggregated and extrapolated to an industry-wide number, total:

- 17,510 lost jobs for passenger carriers, and
- 9,180 lost jobs for air cargo carriers

These approximately 26,700 direct airline and air cargo carrier job losses would result in total job losses to the economy of 398,000 jobs. This estimate, based on economic impact assumptions used by the FAA,[2] consists of: (1) direct commercial service job losses of 184,000 jobs, as a result of airline and air cargo job losses, related job reductions in aircraft manufacturing, airports, and supporting businesses, and secondary impacts; and (2) indirect

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[1] Mainline passenger and cargo carriers only. We estimate the cost to be $21.6 billion over ten years including regional airlines.

[2] See *The Economic Impact of Civil Aviation on the U.S. Economy*, December 2009 and August 2011, Federal Aviation Administration.

commercial service job losses of 214,000 jobs, as a result of reduced spending by visitors at hotels, restaurants, and recreational activities, and secondary impacts. See Summary Tables in Section III.

II. Industry estimate based on industry cost/demand models

A second approach to estimating job loss is to rely on industry models used to predict capacity reductions resulting from industry cost increases. In addition to incorporating historical elasticity experience, these industry cost/demand models include factors relating to the distribution of carriers' variable/fixed costs to estimate cost reductions associated with different levels of capacity reduction. Several recognized industry analysts with sophisticated industry cost/demand models were consulted in reaching our conclusions. Based on these models, we estimate that the approximate $2 billion increase in annual costs resulting from the rule will result in the following capacity decreases:

- 2.3% capacity decrease for passenger carriers, and
- 1.4% capacity decrease for air cargo carriers

The underlying principle for these predicted decreases is that, just as the airlines have applied this principle individually, carriers will be required to reduce capacity to eliminate marginal routes that no longer meet minimum profitability requirements. Airlines have very limited ability to pass through cost increases in the form of higher airfares due to the highly elastic relationship between pricing and demand. This explains the high levels of airline capacity and employee cuts in response to the 2008 fuel price increases. Air cargo carriers may have the ability to pass through some portion of the higher costs from the rule, and therefore are predicted to reduce capacity less than the passenger carriers in response to a similar cost increase.

For purposes of this industry-wide forecast, the estimated capacity reduction percentage is predicted to result in a similar decrease in the percentage of airline and air cargo employees. Note that over the past several years, as capacity has declined, the number of airline employees has declined at a higher rate than the overall decline in capacity.[3]

Based on these assumptions, the estimated job losses for the industry resulting from the rule total:

- 9,090 lost jobs for passenger carriers, and
- 2,770 lost jobs for air cargo carriers[4]

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[3] See, BTS airline employment and capacity (ASMs) statistics 2007-2010. Reported employment decrease of 7.5% 2007/2010 in comparison with ASM decrease of 5.6%.

[4] Base employment is assumed to be 395,328 airline employees based on BTS P10 for 2010 and 198,000 air cargo employees based on BTS P10 as adjusted to capture air cargo employees not included.

These approximately 11,900 direct airline and air cargo carrier job losses would result in total job losses to the economy of 195,000 jobs. This estimate, based on economic impact assumptions used by the FAA, consists of: (1) direct commercial service job losses of 84,000 jobs, as a result of airline and air cargo job losses, related job reductions in aircraft manufacturing, airports, and supporting businesses, and secondary impacts; and (2) indirect commercial service job losses of 111,000 jobs, as a result of reduced spending by visitors at hotels, restaurants, and recreational activities, and secondary impacts. See Summary Tables in Section III.

* * *

Given the many variables involved in this type of estimate, it may be most useful to consider these two estimates as comprising the range of likely impacts of the rule, specifically:

Direct carrier job losses	**Total job losses**
11,900 – 26,700 jobs	195,000-398,000 jobs

III. Summary tables

Aggregated Carrier Job Loss Estimates and Total Job Loss

	Jobs in 000s		
	Primary	Induced	Total
Commercial Service (Direct)			
Airlines	**17.5**	68.0	87.9
Airports	6.7	19.2	23.2
Aircraft Manufacturing	5.8	38.2	40.4
Air Cargo	**9.2**	23.8	32.2
Subtotal	39.1	149.2	183.7
	Primary	Induced	Total
Commercial Service (Indirect)			
Visitor Expenditures	85.7	137.5	208.9
Travel Arrangements	1.1	7.0	5.0
Subtotal	86.8	144.5	213.9
Total Commercial Service	**125.9**	**293.7**	**397.6**

Assumptions:

Airlines and air cargo job multipliers as used by FAA; airport and aircraft manufacturing job change in proportion to airline/air cargo job change; impact multipliers as used by FAA

Visitor expenditure/travel management impact proportional to airline job change; job multipliers as used by FAA

See *Economic Impact of Civil Aviation on the U.S. Economy, December 2009,* FAA, Table 4 US Civil Aviation Economic Impact Study Detail. Total jobs impact based on December 2009 FAA methodology, with individual category totals reduced by varying amounts (5.3% on average) to reflect recalibration with results provided in Economic Impact of *Civil Aviation on the Economy*, FAA, August 2011

Cost-Driven Capacity Reduction Estimates and Total Job Loss

	Jobs in 000s		
	Primary	Induced	Total
Commercial Service (Direct)			
Airlines	**9.1**	35.3	45.6
Airport	3.0	8.6	10.3
Aircraft Manufacturing	2.6	17.0	18.0
Air Cargo	**2.8**	7.2	9.7
Subtotal	17.4	68.0	83.7
Commercial Service (Indirect)			
Visitor Expenditures	44.5	71.4	108.5
Travel Arrangements	0.6	3.6	2.6
Subtotal	45.1	75.1	111.1
Total Commercial Service	**62.5**	**143.1**	**194.8**

Assumptions:

Airlines and air cargo job multipliers as used by FAA; airport and aircraft manufacturing job change in proportion to airline/air cargo job change; impact multipliers as used by FAA

Visitor expenditure/travel management impact proportional to airline job change; job multipliers as used by FAA

See *Economic Impact of Civil Aviation on the U.S. Economy, December 2009,* FAA, Table 4 US Civil Aviation Economic Impact Study Detail. Total jobs impact based on December 2009 FAA methodology, with individual category totals reduced by varying amounts (5.3% on average) to reflect recalibration with results provided in Economic Impact of *Civil Aviation on the Economy*, FAA, August 2011

TAB 20

U.S. Department of Transportation

FEDERAL AVIATION ADMINISTRATION

Office of Aviation Policy and Plans

Washington, D.C. 20591

REGULATORY IMPACT ANALYSIS

Flightcrew Member Duty and Rest Requirements

PART 117

Final Rule

OFFICE OF AVIATION POLICY AND PLANS

November 18, 2011

Table of Contents

Disposition of Issues Raised by Comments

The following summarizes the FAA's responses to the comments on the economic analysis. These responses address the most substantive comments made in response to the Notice of Proposed Rulemaking (NPRM), including comments made by: Air Transportation Association (ATA), American Airlines, United Airlines, Cargo Airline Association (CAA), Federal Express, United Parcel Service (UPS), National Air Carriers Association (NACA), Atlas Air Worldwide Holdings, Lynden Air Cargo, Omni Air International, Inc., and Southern Air, Inc.

Commenters questioned the base year dollar and analysis period. The final rule analyzes current year (2011) with a two year delay in both benefits and costs. The benefits and costs are presented in a ten year stream and we have provided sensitivity analysis based upon a discount rate of both 7% and 3%. A ten year analysis is sufficient for the costs and benefits to be in a steady state.

The FAA also received comments questioning the validity of the accident set. To address the criticism of using the historical twenty-year analysis period, the FAA narrowed the accident set to the most recent ten years. However, while this approach addressed the issues raised by the commenters, narrowing of the analysis time period reduces the number of accidents/observations available for the benefit analysis. Consequently, while there is a sufficient accident basis to demonstrate a broad benefit basis justifying the cost of this rule, the sparse data does not permit accident analysis for every industry segment.[1] The benefit forecast includes the expected larger

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[1] As discussed in the Regulatory Impact Analysis, the FAA was able to determine the societal benefit of applying this rule to all-cargo operations. The FAA ultimately concluded that this benefit did not justify the costs of requiring all-cargo operations to operate under part 117.

future airplanes and higher load factors. Even though the rate of accidents may have declined in the last ten years, the future consequences may well be more catastrophic.

Commenters questioned that the historical accident rate is significantly higher than the probable accident rate for the period of analysis because accidents have declined in recent years.

The requirements contained in this final rule only address the rates of pilot fatigue. As Table 4 in the Regulatory Impact Analysis shows, the preventable accident rate related to fatigue has not significantly decreased in the last ten years.

The Regulatory Impact Analysis also includes a list of appropriate accidents along with the final Commercial Aviation Safety Team (CAST) scoring. The accident appendix includes detailed fatigue information and the reasoning behind the final CAST scoring.

After considering the comments on the regulatory impact analysis (RIA) for the NPRM, the FAA took a different approach to evaluate the final rule. In the analysis for the NPRM, the FAA attempted to show through statistical analysis and simulation that a broader fatigue problem existed than what could be shown through NTSB accident findings. In response to industry comments objecting to this approach, the FAA Office of Aviation Safety began by narrowing the set of accidents to those with a strong correlation to fatigue and hence narrowed the benefit analysis from a broader fatigue problem to the specific regulatory changes. As a result, the FAA re-examined every accident used in the NPRM and applied the CAST methodology only to the accidents whose likelihood would have been reduced if the requirements in the final rule had been effective prior to the accident. Using this methodology, the FAA re-analyzed the effectiveness of the provisions in the final rule in mitigating accidents where fatigue was identified as a factor in the accident, and removed accident cases that were not closely correlated with fatigue factors from the NPRM. From this exercise, a smaller set of accidents was determined appropriate for further economic analysis of the final rule. With a smaller number of accidents, a simulation methodology was no longer appropriate. Instead, the FAA used a commonly-used benefit methodology. This methodology is grounded in NTSB findings, uses the CAST methodology, and is also transparent and easily reproducible. The methodology is discussed in the full regulatory evaluation.

Industry questioned the use of $12.6 million for a statistical life value.

The use of $12.6 was for a sensitivity test. For the final rule, the FAA uses the $6.2 million as the value of an averted fatality as used commonly by the Department of Transportation.

Commenters also objected to the FAA's assumptions regarding the 25% cost-savings resulting from long-term scheduling optimization in RIA. As the FAA stated in the RIA, the assumption of the long-term schedule optimization factor was dropped because the operation cost was analyzed by the crew pairing optimizer. This different approach estimates operation and scheduling cost of the final rule by building duty and rest time restrictions changing from existing FAA regulations and industry scheduling data into a Cygnus, CrewPairing's (CP) crew scheduling optimization model. Cygnus has been used by more than 30 major airlines worldwide over the past 40 years and is currently used by a number of carriers. CP optimization used constraints contained in the final rule, pooling with the best available industrial data (wages, numbers of flightcrew members sourced from Form 41), to estimate costs of the final rule.

Commenters also contended that the FAA underestimated the NPRM costs related to flight operation in that carriers would be forced to hire new crewmembers and increase flight duty periods (FDP).

The FAA has re-estimated the costs reflecting final rule modifications and used the above-referenced crew scheduling model to better estimate whether the rule would force carriers to hire new crewmembers. The use of a crew pairing optimizer enabled FAA to more accurately model the impacts of the rule on industry crew scheduling costs than was possible during NPRM cost analysis. The data in the final rule RIA included full bid line and pairing information for each flightcrew member, and included both line holder and reserve flightcrew members. The crew pairing optimization did not show a need to hire new crewmembers to comply with this rule because the flightcrew members currently used in reserve allow certificate holders to conduct operations under this rule without hiring additional flightcrew members.

Commenters did not support the costs related to schedule reliability and argued that they were underestimated. One commenter stated the costs would be as high as $9.6 billion. They argued that by excluding the cost of schedule buffering required by multiple provisions of the NPRM, the FAA omitted the major source of cost to the industry.

As stated elsewhere, the FAA has largely removed schedule reliability from this rule. The FAA has instead adopted provisions that limit extensions of the FDP and requires reporting of FDP extensions and activities that were not otherwise permitted by the provisions of §117.11, §117.19 and §117.29 in the Final Rule. Under this amendment, costs to airline carriers are limited to reporting exceptional activities. As such, these costs are expected to be relatively minor. By dropping schedule reliability requirement and limiting the associated reporting burden to flight-duty-period (FDP) extension reporting requirements, the cost in dispute by the commenters became a computer programming cost and was estimated to be about one million dollars.

Some commenters stated the appropriate average wage rate should be $297 per hour.

The FAA notes this wage rate significantly contributed to the industry cost estimates. The $297 per hour wage rate as an average is two times the wage rate from Form 41 and four times the wage rate from the 2010 Census Bureau on the airline industry.

Commenters also argued that the FAA underestimates fatigue training cost described in the NPRM.

All carriers already are required to comply with Public Law 111-216 Section 212(b)(2)(B) with respect to the fatigue risk management plan and training (FRMP). In this final rule, the FAA removed the proposed requirement that pilots receive additional fatigue training that is not required by the FRMP. As such, the FAA expects the cost of fatigue education and training to be largely reduced. The final rule does expand the fatigue education and training requirements to dispatchers and certain members of management. The FAA made this change because air carriers operating under 14 CFR part 121 will be in compliance with the statutory pilot training requirement as part of their FRMPs. Since the final rule extends fatigue training to management and dispatchers, it is expected to be added to existing fatigue risk management education and training program.

Numerous commenters stated that the FAA underestimated the cost of rest facilities due to the loss of first class seating and out-of-service time required for infrastructure installation.

The FAA re-analyzed the facility cost based upon the actual numbers and types of facilities that will need to be put in by querying the inspectors for the fleet of airplanes. The FAA assumed the worst case scenario (all class 1 facilities). The FAA recalculated the number of airplanes needing additional upgraded rest facilities. Based on the existing fleet, the FAA estimates 332 airplanes will need class 1 facilities. In addition, the FAA re-estimated compliance costs of optimizing existing equipment and installing first class facilities. We have also estimated downtime and additional fuel burn costs. The final rule rest facility costs include purchase, design and engineering, physical installation of the facilities on the affected aircraft, downtime impact on revenue, and fuel burn cost. Therefore, the cost of rest facilities was estimated to the full extent in the final rule.

The commenters stated that the FAA's cost analysis does not factor in the costs of the cumulative limits. The FAA notes that all known constraints including existing monthly and annual constraints were imbedded in CP optimization.

The commenters submitted that the FAA assumed for the NPRM that the industry's collective bargaining agreements (CBAs) will be renegotiated to permit carriers to adapt to the new rules without any additional costs to the carriers and also assumes that any short term costs that result from conflicts between the new rule and existing CBAs should not be "counted" as part of the NPRM.

The final rule does not require renegotiation of current CBAs. In the final rule the FAA did not calculate potential gains based on the renegotiation of CBAs. The final rule will give two years buffer for carriers to implement all provisions. The FAA still believes that CBA negotiations could result in a change of economic interests between carriers and crewmembers. Any such change is a transfer of benefits and costs between carriers and bargaining units. Such transfers would be negotiated between parties and transfers do not change the total cost and benefits to society.

Many entities conducting supplemental operations stated that the rule would cause the nature of their operations to significantly change, which would result in lost revenue opportunities or much higher cost, or both.

The FAA adopted significant modifications in the final rule to mitigate the impact on supplemental operations. For example, in the final rule, the FAA made compliance with part 117 voluntary for all-cargo operations. With regard to supplemental passenger operations, the FAA increased both the augmented and unaugmented FDP limits from the NPRM. The FAA also increased the split-duty credit and made that credit easier to obtain. In addition, the FAA notes that section 119.55 provides the mechanism to obtain deviation from existing regulations for military missions. Taken together the FAA has provided substantial flexibility for supplemental operations, and as a result, permits most existing revenue opportunities relative to flight safety risks based on past ten years of NTSB accident findings.

The commenters contend that the FAA assumes, without any evidence, that there will be a reduction in absenteeism due to "improved fatigue management," and that reduced absenteeism costs will offset part of the cost of the NPRM.

The FAA believes that the final rule will improve productivity and reduce absenteeism by the enhanced fatigue management system. CDC's research shows that chronic fatigue can cause illness and even death[2]. Comments and data received from Air Line Pilots Association (ALPA), the largest independent pilots' union in the world, devoting more than 20 percent of its dues income to support aviation safety, validated the FAA's estimation of cost saving from reducing flight-crew members fatigue and absenteeism.

Commenters questioned that there is no justification provided that sick leave use will be reduced by 5%. The FAA has verified this number with labor representatives and the supporting document verifying this information can be found in the docket.

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[2] CDC' s MMWR, Weekly, **February 29, 2008 / 57(08);200-203**

Commenters contended that accidents involving two pilots and a flight engineer should be analyzed separately because in the modern era almost all flights are operated without a flight engineer.

This rule does not distinguish between accidents involving a flight engineer and accidents without a flight engineer because it is difficult to attribute specific amounts of fatigue and accident causality to a flight engineer. More specifically, it is difficult to predict in a fatigue-related accident, how the two pilots would have handled the aircraft in question if a flight engineer had not been present. As such, because it is unclear how much flight-engineer fatigue contributed to past accidents and that this rule does not prohibit flight engineers from working on the flight deck, the Regulatory Impact Analysis used for this rule does not distinguish between accidents involving two pilots and those involving a flight engineer.

Some commenters stated that the FAA simply ignores flight cancellation costs despite the fact that the NPRM will result in substantial increases in flight cancellations.

As discussed above, the FAA calculated the scheduling costs of this rule by running the pertinent data through the Cygnus crew scheduling optimization model. The Cygnus model did not indicate that there would be an increase in cancellations as a result of the changes imposed by this rule. This is because certificate holders will be able to use their existing staff members to cover the scheduled flights.

It was argued by commenters that by excluding the cost of schedule buffering required by multiple provisions of the NPRM, the FAA has omitted the major source of cost to the industry.

There are a few major changes related to crew scheduling made in the final rule from NPRM, which significantly reduced the cost to the industry. The pertinent changes from the NPRM are: (1) a flight extension for unexpected circumstances that arise after takeoff, and (2) the removal of the requirement that “circumstances beyond the control of the certificate holder” have to be present in order to utilize the 2-hour FDP extension for certain unforeseen operational circumstances. Using the crew pairing optimizer to simulate operation schedule, costs that attributable to the final rule were estimated to the full extent, including the cost of schedule buffering.

The commenters further stated that the FAA has omitted the cost estimation attributable to the provision of “three consecutive nights” (section 117.27, NPRM), which is more likely to impact cargo carriers partly because they have a substantial concentration of operation during the night time period and flight crew that are accustomed to night time operations.

As an initial matter, the FAA notes that, based on the cost-benefit analysis, all-cargo operations are not required to operate under part 117. However, based on industry comments the FAA has mitigated the burden to cargo operators who may choose to operate under part 117 by reducing (to two hours) the length of “mid-duty rest” that is necessary to schedule five consecutive nighttime FDPs. Moreover, UPS and FedEx stated in their comments that they currently provide their flightcrew members with a mid-duty breaks that are, on average, two hours long. Because the final rule permits five consecutive nights with two-hour breaks, the impact of the consecutive-night provision on all-cargo operators such as UPS and FedEx will be minimal.

The commenters also argued that, under the FAA’s cost-benefit methodology, there is no benefit to limiting duty time below 15 hours.

The FAA agrees the risk of accident prevalence in the 15th hour block and beyond is much greater than that associated with duty times short of the 15th hour block. To evaluate this proposition, the FAA computed ratios of accidents to exposure duty hours (dividing accidents in a sequence of flight hour blocks by pilot exposure duty hours), which substantiated the conclusion that accident risk steeply increases in the 15th hour block and beyond. However, the FAA has also determined that FDPs of less than 15 hours can lead to unacceptably high accident risk. For example, the statistic evidence indicates that the ratios of accidents to block hour rises in a fast rate in the 13th to 14th hour block range. Therefore, the regulation of flight duty time being limited under the 15th hour block is necessary and beneficial.

Allied Pilots Association (APA) generally supported the NPRM but stated that the FAA overestimated computer programming cost, fatigue training costs due to overstated training pay and rest facility installation costs. In addition, APA commented that the FAA underestimated the schedule optimization factor and the agility of air carriers when motivated to achieve efficiency.

The computer programing cost is a very small component of airline operation cost. Since the computer programming cost was estimated based on the market pricing, it was adjusted slightly lower or at about the same level as the FAA gained more accurate market data than that used for NPRM through its software providers. Overall, the operation cost in the final rule was revised and turned out to be lower than that of NPRM. Fatigue training costs was revised to be lower than that of NPRM because of the changes made to the proposed fatigue training requirements by the final rule. The revised rest facility installation cost was also lower than that of NPRM. APA's comment on the overestimation of the NPRM cost was based on the assumption that long-term optimization will occur at much faster rate than implicit in the cost analysis, which would result in more savings in the long run than that in the short run. The FAA agrees that long-term optimization of air carriers could be greater than expected. The FAA believes that the crew scheduling optimizer program provides a better estimate to the final rule.

Therefore, the FAA believes that the final rule cost estimates incorporating crew scheduling optimization model accurately reflect the compliance costs.

ATA's Oliver Wyman analysis on September 14, 2011, "Estimated Job Loss Resulting from Flightcrew Member Duty and Rest Requirements" attached to the ATA petition on Flight, Duty and Rest asserted that the proposed rule would cause nearly 17,000 U.S. airline jobs, which would result in total job losses to the economy of 398,000 jobs.

The FAA believes that ATA's analysis of the jobs impact from the proposed Flight, Rest and Duty rule is inaccurate. ATA's jobs impact analysis is based on its estimate, derived from its analysis of the NPRM, that this rule will cost $19.6 billion over a 10-year period. However, many of the major provisions of the final rule have been significantly altered from the NPRM, and, as discussed elsewhere, the FAA estimates that the final rule will cost approximately $390 million over 10 years. This $390 million cost is significantly smaller than the $19.6 billion cost on which ATA based its job impact analysis. CrewPairing's analysis of the final rule results in no change in pilot employment. Therefore, the FAA does not agree with ATA's job impact findings.

With regard to the accidents that were used to calculate the benefits for this rule, some commenters stated that the ATI 2/16/95 flight (RT2) was a part 91 ferry flight, and that the issues leading to that flight's accident have been addressed by other rulemakings. Consequently, the commenters assert, this flight would not be permitted under current rules.

This comment refers to an accident involving ATI in Kansas City during a nighttime Part 91 engine-out ferry flight in a 4-engine DC-8. Prior to takeoff, the Flight Engineer (FE) had improperly determined the minimum control speed on the ground (VMCG), which produced a value that was 9 knots too low. On the first takeoff attempt, the pilot applied power too soon to the “asymmetrical engine” (the serviceable engine on the side with the failed engine) and was unable to maintain directional control during the takeoff roll. He rejected the takeoff and, in preparation for a second takeoff, the pilot agreed to have the FE advance the throttle on the next takeoff attempt. This conflicted with the prescribed procedure.

At 3,215 feet into the takeoff roll, the DC-8 started to veer to the left. At 3.806 feet, the aircraft rotated with a tail strike but the tail remained in contact with the runway for another 820 feet. At 5,250 feet, the aircraft became airborne and climbed to 100 feet, then sank and crashed. All 3 crew members were killed.

NTSB focused on 2 core issues. First, NTSB found that the crew was flying after a shortened rest break, since rest periods were not required for ferry flights. According to the report, the crew was fatigued from lack of rest and lack of sleep, and from disrupted circadian rhythms. Second, NTSB found that the crew did not have adequate, realistic training in techniques or procedures for a 3-engine takeoff. NTSB added that the crew did not adequately understand 3-engine takeoff, and did not adequately understand the significance of VMCG.

In response to an NTSB recommendation related to training crews for a 3-engine takeoff ((A-95-39), FAA issued a Flight Standards Information Bulletin (FSIB). The FSIB directed FAA principal operations inspectors to inform their respective operators to take additional measures to ensure: (1) that aircraft manual requirements for engine-out ferry flights are clear; (2) that crew training segments are clearly outlined for engine-out operations; and (3) that operators use only crews specifically trained and certified for engine-out operations. This has become FAA policy and NTSB found the action acceptable and closed the recommendation.

Consequently, the comment is appropriate to the degree that it addresses the issue of training, which is not part of the proposed rule. However, FAA believes that this flight also illustrates the role and risks associated with fatigue, which the FSIB noted above did not address. With or without training in 3-engine takeoffs, NTSB's findings on fatigue in this accident remain pertinent to this rulemaking.

Benefit/Cost Summary

We have analyzed the benefits and the costs associated with the requirements contained in this final rule and our estimates are summarized in table 1. The FAA has made significant changes to the final rule since the NPRM. The training requirement has been substantially reduced because the FAA has determined that pilots are already receiving the requisite training as part of the statutorily required Fatigue Risk Management Plans. The FAA also has removed all-cargo operations from the applicability section of the new part 117 because their compliance costs significantly exceed the quantified societal benefits.[3] All-cargo carriers may choose to comply with the new part 117 but are not required to do so. Since the carrier would decide voluntarily to comply with the new requirements, those costs are not attributed to the costs of this rule. The costs associated with the rest facilities occur in the two years after the rule is published. The other costs of the rule and the benefits are then estimated over the next ten years.

We provide a range of estimates for our quantitative benefits. Our base case estimate is $376 million ($247 million present value at 7% and $311 million at 3%) and our high case estimate is $716 million ($470 million present value at 7% and $593 million at 3%). The total

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[3] The projected cost for all-cargo operations is $306 million ($214 million present value at 7% and $252 million at 3%). The projected benefit of avoiding one fatal all-cargo accident ranges between $20.35 million and $32.55 million, depending on the number of crewmembers on board the aircraft.

estimated cost of the final rule is $390 million ($297 million present value at 7% and $338 million at 3%).

Table 1: Summary of Benefits and Costs

Total Benefits over 10 Years			
Estimate	**Nominal (millions)**	**PV at 7% (millions)**	**PV at 3% (millions)**
Base	**$ 376**	**$ 247**	**$ 311**
High	$ 716	$ 470	$ 593

Total Costs over 10 Years			
Component	**Nominal (millions)**	**PV at 7% (millions)**	**PV at 3% (millions)**
Flight Operations	$236	$157	$191
Rest Facilities	$138	$129	$134
Training	$16	$11	$13
Total	**$390**	**$297**	**$338**

Benefit Analysis

This rule is intended to address the problem of fatigued pilots flying in Part 121 commercial service. The nature and extent of the problem is such that the NTSB continues to list pilot fatigue as one of the Most Wanted Transportation Safety Improvements. The NTSB recommendations are based on accident investigations and the NTSB safety study on airline safety. The requirements contained in this final rule address both NTSB recommendations and existing public law. This benefit estimate first examines the nature of fatigue, followed by its causes and how it relates to transportation. Second, we summarize some recent findings on fatigue and occupational performance. Next, we look at the magnitude of crew fatigue in Part 121 passenger operations by briefly examining fatigue reports in the context of this final rule. We then re-analyze the likely effectiveness of the requirements contained in this final rule and the potential to decrease these types of accidents in the future. We project a likely number of preventable events that will occur in absence of this final rule. Finally, we estimate the benefits that will be derived from preventing such events. We provide a base case estimate, and a high case estimate, in addition to a threshold/break even analysis.

The Nature of Fatigue

Most fatigue studies agree that, "fatigue refers to a subjective desire to rest and an aversion to further work, coupled with an objective decrease in performance."[4]

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[4] Jones, et al., "Working hours regulations and fatigue in transportation: A comparative analysis," *Safety Science*, Vol. 43, 2005.

Fatigue is characterized by:

- "increasingly frequent lapses in performance,
- general cognitive slowing, including a lowering of optimum performance,
- memory problems,
- time on task decrements, and
- an increasing inability to maintain the vigilance required to perform the tasks required."[5]

Fatigue has been described as "a nonspecific symptom because it can be indicative of many causes or conditions including physiological states such as sleep deprivation….[s]ome describe fatigue in terms of physiological data or 'objective' observations of…decrements in work or performance….or time-related deterioration in the ability to perform certain mental tasks."[6] While physiological criteria related to fatigue can be readily measureable, subjective feelings of fatigue are not directly observable, and in some instances individuals who are exhibiting diminished performance levels also feel confident in their ability to focus and perform assigned tasks.

Causes of Fatigue

A number of factors increase the risk of fatigue. These include:

- Time of day is very important, because the body follows a rhythm over an approximately 24 hour period, often referred to as a circadian cycle

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[5] Jones, et al., "Working hours regulations and fatigue in transportation: A comparative analysis," *Safety Science*, Vol. 43, 2005.

[6] Torres-Harding, Susan and Leonard A. Jason, "What is Fatigue? History and Epidemiology," *Fatigue as a Window to the Brain*, edited by John DeLuca. The MIT Press, 3-18, 2007.

- The amount of recent sleep that a person has received also affects the level of fatigue risk; most people need an average of eight hours of sleep per 24 hour period.
- The number of continuous hours awake also increases fatigue risk, and for most individuals, once the number of continuous hours awake exceeds 17, fatigue risk increases significantly.
- Sleep debt, the difference between the amount of sleep needed to be fully rested and actual sleep, also contributes to fatigue. Sleep debt accumulates over time, and fatigue risk is higher if sleep debt exceeds eight hours
- Work load and time on task can also affect fatigue risk. If work intensity is high and/or there is a long continuous period of time on task, the risk of fatigue increases.

Fatigue and Transportation

The nature of work in the transportation sector makes that sector especially susceptible to risks to performance, vigilance and response to hazards that are associated with fatigue. Workdays of those responsible for the safety of transportation operations can be characterized by long work periods, often at nighttime or early morning hours. Because transportation workers must sometimes rest or sleep away from home, conditions for rest and sleep quality are also important.

Analysts have examined the links between the specific features of work in the transportation industry, including commercial aviation, and the general features of human physiology and fatigue for decades. For commercial aviation, it has been nearly two decades since the first citation of fatigue as a probable cause for a major aviation accident. This accident, the crash of American International Airways flight 808 at Guantanamo Naval Air Station, Cuba, on August 18, 1993, was investigated by the National Transportation Safety Board. Probable causes of the accident identified by the NTSB included "the impaired judgment, decision making, and flying abilities of the captain and flightcrew due to the effects of fatigue…"

As part of the investigation of that accident, NASA researchers and contractors performed an analysis of the links between aviation risks and the effects of fatigue on human vigilance and performance. This research was reported as part of the NTSB report on the Guantanamo Bay accident[7] and later revised for inclusion in an NTSB report on U.S. Department of Transportation efforts to address fatigue issues in Transportation.[8]

This NTSB research and literature summary provides a thorough and well-documented review of these issues. In the 1999 restatement of the research results in the context of addressing fatigue issues in transportation generally, the following summary is provided:

Fatigue, sleep loss and circadian disruption created by transportation operations can degrade performance, alertness and safety. An extensive scientific literature exists that provides important physiological information about the human operator, which can be used to guide operations and policy. For example, there are human physiological requirements for sleep, predictable effects of sleep loss on performance and alertness and patterns for recovery from sleep loss. Additionally, the circadian clock is a powerful modulator of human performance and alertness, and in transportation operations, it can be disrupted by night work, time zone changes, and day/night duty shifts. Scientific examination of these physiological considerations has

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[7] Rosekind, et.al.,"Appendix E: Analysis of Crew Fatigue Factors," Aircraft Accident Report: Uncontrolled collision with Terrain, American International Airways flight 808, Douglas DC-8-61, N814CK, U.S. Naval Air Station, Guantanamo Bay,Cuba, August 18, 1993. Washington D.C., NTSB Report AAR-94/04, pp. 133-144. http://human-factors.arc.nasa.gov/zteam/PDF_pubs/G_Bay/GuantanamoBay.pdf

[8] Rosekind, et.al., "Appendix C: Summary of Sleep and Circadian Rhythms," *Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue*. Washington D.C. NTSB Safety Report NTSB/SR-99/01, May 1999, pp.67-81. http://www3.ntsb.gov/publictn/1999/sr9901.pdf

documented a direct relationship to errors, accidents and safety. This scientific information can provide important input to policy and regulatory considerations.

Recent Findings on Fatigue and Occupational Performance

Fatigue is prevalent in the U.S. workforce, with nearly 38 percent of workers in a study reporting fatigue during a two-week period.[9] The National Sleep Foundation conducted a poll in 2008, which found that 29 percent have fallen asleep or become very sleepy while at work and two percent did not go to work due to sleepiness or a sleep problem.[10] Numerous studies have found that fatigue can significantly reduce productivity. A review of published studies on shift work and productivity found a large decrease in efficiency during the night shift, with the low occurring at 3:00AM. On average, the authors found that productivity was five percent lower at night.[11]

A large scale study was conducted at 40 companies and institutions in the Netherlands to investigate the relationship between fatigue and future sickness absence. The presence of fatigue was measured using self-reported symptoms, with employers providing absence data. The study controlled for numerous socio demographic and work characteristics. The investigators found that higher levels of fatigue were statistically significant predictors of both short-term and long-term sickness absence.[12]

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[9] Ricci, et al., "Fatigue in the U.S. workforce: prevalence, and implications for lost productive work time," *Occup Environ Med*, Vol. 49(1): 1-10, 2007.

[10] National Sleep Foundation, "2008 Sleep in America Poll: Summary of Findings."

[11] Folkard and Tucker, "Shift work, safety and productivity," *Occupational Medicine*, Vol. 53, 2003.

[12] Janssen, et al., "Fatigue as a predictor of sickness absence: results from the Maastricht cohort study on fatigue at work," *Occup Environ Med*, 2003, 60(Suppl I): i71-i76.

A study was conducted to estimate fatigue prevalence and associated health-related lost productive time (LPT) in U.S. workers. The investigators found that workers with fatigue were much more likely to report health-related LPT, with a cost of $136.4 billion annually. This amount exceeded health-related LPT reported by workers without fatigue by $101.0 billion.

A study compared the rate of errors made by medical residents working in the ICU on 80 hour weeks versus those on 63 hour weeks. The residents with the shorter work week schedule experienced half the rate of attention failures. The residents with the longer work week schedule made serious medical errors (those causing or having the potential to cause harm to a patient) at a rate 22 percent higher than the residents with the shorter work week schedule.[13]

The railroad industry is at a relatively high risk of fatigue, due to typical 24 hour per day operations. A number of railroads have implemented fatigue countermeasures, which generally reduced absenteeism. For instance, after implementation of fatigue countermeasures for CANALERT, absenteeism decreased from 8.1 to 3.2 percent. After fatigue countermeasures were implemented for the Conrail-Buffalo-Toledo IMPAC project, a statistically significant increase in attendance from 95.21 percent to 98.06 percent was observed.[14] This data demonstrates the potential for fatigue issues, which we will now examine within the specific requirements of this final rule.

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[13] Board on Health Sciences Policy, "Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem," *The National Academies Press*, 2006.

[14] Sherry, "Fatigue Countermeasures in the Railroad Industry: Past and Current Developments," *Association of American Railroads*, 2000.

ASRS

One can observe fatigue in aviation by examining the Aviation Safety Reporting System (ASRS). The ASRS collects, analyzes, and responds to voluntarily submitted aviation safety incident reports in order to lessen the likelihood of aviation accidents. It is part of a continuing effort by government, industry, and individuals to maintain and improve aviation safety by collecting voluntarily submitted aviation safety incident/situation reports from pilots, controllers, and others**.**

The data in the ASRS is used to:

- Identify deficiencies and discrepancies in the National Aviation System (NAS) so that these can be remedied by appropriate authorities.
- Support policy formulation and planning for, and improvements to, the NAS.
- Strengthen the foundation of aviation human factors safety research. This is particularly important since it is generally conceded that over two-thirds of all aviation accidents and incidents have their roots in human performance errors.

ASRS assures confidentiality and data cannot be traced back to individual operators. So although we cannot claim the rule could prevent specific ASRS events, it is a useful tool in evaluating and validating the presence of fatigue in Part 121 operations. We performed a query for Part 121 ASRS for Fatigue[15]. Since June of 2009, there were a total of 256 reports where fatigue was cited as a factor. We have neither culled the data nor edited any of the data that was reported to ASRS. The top seven results are listed in Table 2.

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[15] We believe that this is a very conservative assumption because other human factors can reveal fatigue, such as confusion and communications breakdown.

Table 2: ASRS Part 121 Fatigue Reports

Result	Total	Relative %
General None Reported / Taken (No action was taken as a result of the fatigue issue reported)	68	26.6%
General Work Refused (Fatigue caused a worker to refuse an assignment)	21	8.2%
General Maintenance Action (Typically a fatigue event related to a maintenance issue—not related to this final rule).	14	5.5%
Flight Crew Became Reoriented (Confusion related to some type of malfunction.)	10	3.9%
Flight Crew Took Evasive Action (Crew took action to avoid an accident or incident)	8	3.1%
Air Traffic Control Issued New Clearance (Substitute clearance given to get back on track)	5	2.0%
Flight Crew Executed Go Around / Missed Approach	5	2.0%

One captain on an international flight described an onerous flight sequence in the Pacific he believed to be unsafe due to cumulative and predictable fatigue:

> “This report concerns a trans-Pacific flight assignment including back to back all night pairings (body clock), two un-augmented inter-Asia segments and 36 hours of flight time. We started the sequence with a 12.7 hour actual flight, single augmented with an hour plus delay on the front end. When we arrived we cabbed to downtown for an additional 1.5 hours on the body before rest. The first internal Asia leg is all night, un-augmented. The return leg is daylight-but all night body time-followed by another 1.5 hour cab ride downtown. The [opportunities for] rest were insufficient to maintain any alertness particularly on the last leg. Both the First Officer and I experienced periods of unintended sleep while at the controls. No amount of coffee or mental discipline was sufficient to stay awake!!! This is unsafe and made more unsafe by requiring: 1. Over 12 hours single augmented on the first leg. 2. Two un-augmented legs on the back side of the clock with long preflight awake hours. 3. Over 8 extra hours of "duty time" in CABS!!! Rework this trip before someone gets hurt. No one in the cockpit for the last 6

hours was at their peak to respond to irregular situations. We weren't even able to stay awake the whole time in the seat".

Even if no anomalies occur during a flight, a fatigued crew may be poorer problem solvers than well-rested crews as noted in the research cited above, and thus add a degree of risk to the system. In addition, taking evasive action and missed approaches because of fatigue are serious safety events indicating substantial risk manifesting in the current system.

Effectiveness

It is usually the case that multiple factors can be identified as causes of specific accidents, and it is seldom the case that a specific rule is 100 percent effective at addressing a variety of accident causal factors. In particular, fatigue is rarely a primary or sole cause of an accident, and therefore this final rule will not likely prevent all future fatigue related accidents. For this final regulatory evaluation, we have established a modified effectiveness ratio to categorize accidents for which fatigue may be a contributing causal factor. This number represents the likelihood the requirements contained in this final rule would have prevented an accident from occurring. It is applied in the calculation of the number of forecasted fatigue accidents, if no action was taken to address the fatigue problem in Part 121 operations.

In its analysis of the effectiveness of the final rule, the FAA reviewed accidents that could have been prevented or could have been influenced by the requirements contained in this final rule. The effectiveness analysis works by assessing the likely capability of the requirements contained in the final rule to have prevented those accidents. As part of this analysis, the Office of Accident Investigation reviewed the accident reports from NTSB and foreign investigative authorities on all accidents where the NTSB cited fatigue or fatigue was thought to be either a cause or factor. This was done in order to assess the likelihood that the provisions of the final rule would have averted those accidents (including positioning flights operating under Part 91).

A consistent definition was applied to the 20-year history as the requirements of the rule apply to all Part 121 operations. As such, we reviewed the accident history for all operations that would currently operate under Part 121. The final analysis will take into account NTSB findings, FAA's independent assessment, and comments to the docket. Some accidents reviewed scored "zero" because fatigue could not be established as a significant factor or because the final rule would not prevent such an event had the requirements been in place today. These accidents were removed from our effectiveness analysis and forecast. Because this final rule does not mandate compliance with Part 117 for all-cargo operations, we also removed them from our final analysis. Anticipated costs and benefits for these operations, were the rule to apply on a mandatory basis, are provided in footnotes to the relevant discussions in this document.

Each accident was then re-evaluated by conducting a scoring process similar to that conducted by the Commercial Aviation Safety Team (CAST), a well-documented and well understood procedure, similar to the NPRM. The FAA Office of Accident Investigation used the NTSB recommendations along with narratives, probable cause, contributing factors and other pertinent data to score the accidents. When these accidents were not well defined in the probable cause or contributing factors statements of the NTSB reports, Accident Investigation used a Joint Implementation Monitoring Data Analysis Team (JIMDAT)-like method. The JIMDAT-type scoring system is from 0 to 5, and the score is based on the likelihood that a proposed action would have mitigated that accident. The level and percentage of effectiveness criteria are detailed in Table 3.

Table 3: JIMDAT-Type Scoring System

5	90% effectiveness. The proposed requirement directly addresses the NTSB causal factors and would very likely prevent the accident in the future.
4	75% effectiveness. The proposed requirement directly addresses the majority of the NTSB causal factors and would probably prevent or is likely to reduce the risk of the respective accident, given the circumstances that prevailed.
3	50 % effectiveness. The proposed requirement directly addresses one of several NTSB causal factors and is likely to reduce the risk of the respective accident, given the circumstances that prevailed.
2	35% effectiveness. The proposed requirement generally addresses the NTSB causal factors and is likely reduce the risk of the respective accident, given the circumstances that prevailed.
1	15% effectiveness. The proposed requirement is likely to have reduced the risk of the respective accident, given the circumstances that prevailed.
0	0% effectiveness. The proposed requirement would not reduce the risk of this type of accident in the future.

FAA applied this methodology to each pilot fatigue accident to reach an overall effectiveness ratio for the requirements contained in this final rule. The qualitative assessments ranged from zero (0) to low (1), moderate (3), high (4) and very high (5). The qualitative assessments then were converted to quantitative effectiveness scores as follows: zero; 15%; 35%; 50%; 75%; and 90%.

For this analysis, the FAA presents the quantified benefits and effectiveness analysis for a 10-year period that parallels the cost analysis. Although we only forecast ten years of benefits, we have included a twenty year history of accidents, as these are the circumstances and events which have led to this final rulemaking. Table 4 summarizes the past twenty years of pilot fatigue accidents. The appendices contain a summary of each accident and the corresponding effectiveness analyses.

Table 4: 20 Year Accident History

Date	Location	Service	Carrier	A/C	On Bd	Ftl	Ser	Dam-age	Scenario	Score
07/02/1994	Charlotte, NC	121 Pax	US Air	MD-82	57	37	16	Dest	LOC on Approach; Icing	0.15
02/16/1995	Kansas City, MO	Ferry	ATI	DC-8-63	3	3	0	Dest	LOC in RTO; Engine Out	0.9
12/20/1995	Cali, Colombia	121 Pax	American	B757	164	160	4	Dest	CFIT High	0.35
08/25/1996	JFK, NY	121 Pax	TWA	L1011	262	0	0	Sub	Tail Strike Landing	0.35
01/22/1999	Hyannis, MA	Positioning	Colgan Air (Part 91)	BE-1900	4	0	0	Dest	Hard Landing (BETA)	0.15
05/08/1999	JFK, NY	121 Pax	American Eagle	SF34	30	0	1	Sub	RE Landing	0.5
06/01/1999	Little Rock, AR	121 Pax	American	MD-82	145	11	45	Dest	RE Landing	0.15
10/19/2004	Kirksville, MO	121 Pax	Corporate Airlines as American Connexion	BAE-32	15	13	2	Dest	CFIT Low on Approach	0.75
08/27/2006	Lexington, KY	121 Pax	Comair as Delta Connection	CRJ-200	50	49	1	Dest	Wrong Runway T/O	0.35
02/18/2007	Cleveland, OH	121 Pax	Shuttle America as Delta Connection	ERJ-170	74	0	0	Sub	RE Landing	0.5
04/12/2007	Traverse City, MI	121 Pax	Pinnacle as NW Express	CRJ-200	52	0	0	Sub	RE Landing	0.9
06/20/2007	Laramie, WY	121 Pax	Great Lakes	BE-1900	11	0	0	Sub	LOC Bounced Landing	0.15
02/12/2009	Buffalo	121 Pax	Colgan Air	DHC-8-Q400	49	50	0	Dest	LOC In Flight; RE Landing	0.5
Average										52.5%

Quantitative Benefits

James Reason characterizes major accidents and catastrophic system failures as the consequences of multiple, smaller failures that lead up to the actual accident. It is a “Swiss cheese" model of human error[16] and also a sequential theory of accident causation. Reason's model describes four levels of human failure, each one influencing the next. O*rganizational influences* lead to instances of *unsafe supervision* which in turn lead to *preconditions for unsafe acts* and ultimately the *unsafe acts of operators*. The unsafe acts of operators are where most accident investigations are focused. It is a useful framework to illustrate how analyses of major accidents and catastrophic systems failures tend to reveal multiple, smaller failures leading up to the actual accident. The chances of the exact same circumstances happening again and causing the "same accident" are virtually nil but the possibility of preventing a similar set of circumstances is real.

This sequential "Swiss cheese" formulation is a very appropriate tool for characterizing the circumstances leading up to accidents. The nature of fatigue is such that actions, reactions and the thought processes of fatigued crews are more susceptible to the types of cascading errors of judgment described in the Reason model of catastrophic failure. The requirements contained in this final rule will decrease pilot fatigue and therefore the accompanying accidents that are associated with fatigue. While it is very difficult to accurately attribute all past accidents to one or more causes indisputably, we have developed the average effectiveness measure to apply to the estimates and recognize that there are additional uncertainties with preventing a future fatigue related event. First, we examine an accident that occurred on October 19, 2004:

At about 1937 central daylight time, Corporate Airlines a BAE Systems BAE-J3201, struck trees on final approach and crashed short of runway 36 at Kirksville Regional Airport, in

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[16] Reason, 1990

Kirksville, Missouri. The captain, first officer, and 11 of the 13 passengers were fatally injured, and 2 passengers received serious injuries. The airplane was destroyed by impact and a post-impact fire. [17]

Research and accident history indicate that fatigue can cause pilots to make risky, impulsive decisions, to become fixated on one aspect of a situation, and to react slowly to warnings or signs that an approach should be discontinued. Fatigue especially affects decision making, and research shows that people who are fatigued become less able to consider options and are more likely to become fixated on a course of action or a desired outcome. A fatigued pilot might fail to discontinue a flawed approach or might make a risky decision to continue a dangerous approach.

The fatigued crew reported for duty at 0514. The accident was near end of 6th sector on a 'demanding' day. Crew had been on duty 14.5 hours and the PIC is said to have slept poorly night before. The captain was observed resting on a small couch in the company crew room; however, the quality of rest the captain obtained during this time could not be determined. Company pilots stated that the crew room was a noisy meeting area that was not ideal for sleeping.

Additionally, the pilots' high workload during their long day may have increased their fatigue. The accident occurred during the sixth flight segment of the day while the pilots were

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[17] The NTSB evaluated fatigue as a possible factor in this accident and looked at the various circumstances present the day of the accident that might have contributed to the pilots' fatigue. The pilots' available rest time (from about 2100 to 0400) did not correspond favorably with either pilots' reported usual sleeping hours, resulting in much earlier than normal times to go to sleep and awaken. Additionally, the early wakeup call times would have been challenging to both pilots because the human body is normally physiologically primed to sleep between 0300 and 0500.

performing a non-precision approach in low ceilings and reduced visibility. The pilot deficiencies observed in this accident are consistent with fatigue impairment.

Similarly, although the first officer's junior status with the company may have been an issue in his failure to challenge the captain during the approach, he may also have been suffering from fatigue; his failure to monitor and react to the captain's deviations from non-precision approach procedures was consistent with the degrading effects (slowed reactions and/or tunnel vision) of fatigue.

The Safety Board concluded that, on the basis of the less than optimal overnight rest time available, the early reporting time for duty, the length of the duty day, the number of flight legs, the demanding conditions (non-precision instrument approaches flown manually in conditions of low ceilings and reduced visibilities) encountered during the long duty day (and the two previous days), it is likely that fatigue contributed to the pilots' degraded performance and decision-making.

Another fatigue related accident occurred in Traverse City, Michigan on April 12, 2007. The accident occurred well after midnight at the end of a demanding day during which the pilots had flown 8.35 hours, made five landings, had been on duty more than 14 hours, and been awake more than 16 hours. During the accident flight, the CVR recorded numerous yawns and comments that indicate that the pilots were fatigued. Additionally, the captain made references to being tired at 2332:12, 2341:53, and 0018:43, and the first officer stated, “jeez, I’m tired” at 0020:41. Additionally, the pilots’ high workload (flying in inclement weather conditions, and in the captain’s case, providing operating experience for the first officer) during their long day likely increased their fatigue. The aircraft ran off the departure end of the runway during snowy conditions. Although there were no injuries among the 49 passengers, the aircraft was substantially damaged.

As we observe a clear accident history and the accompanying science dealing with fatigue, it is apparent that fatigue threatens aviation safety by increasing the risk of pilot error that could lead to an accident. Fatigue is characterized by a general lack of alertness and degradation in mental and physical performance. Fatigue manifests in the aviation context not only when pilots fall asleep in the cockpit while cruising, but perhaps more importantly, when they are insufficiently alert during take-off and landing. Each flight segment that is flown by a flightcrew member includes a takeoff and a landing, which are the most task and safety-intensive parts of the flight. A flightcrew member whose flight duty period (FDP) consists of a single flight segment only has to perform one takeoff and landing, while a flightcrew member whose FDP consists of six flight segments will have to perform six sets of takeoffs and landings. Because takeoffs and landings are extremely task-intensive, it logically follows that a flightcrew member who has performed six sets of takeoffs and landings will be more fatigued than the flightcrew member who has performed only one takeoff and landing. Reported fatigue-related events have included procedural errors, unstable approaches, lining up with the wrong runway, and landing without clearances. As such, a fatigued crew is dangerous no matter what "type" or segment of operation is examined and the requirements in this final rule will eliminate the distinctions between various operations.

As we have shown, in an airplane accident, there is a series of errors (both causes and factors) that contribute to an accident. Accident scenarios can vary greatly depending on phase of flight, the type of operation, phase of flight and size of the airplane. While pilot fatigue can occur during any stage of flight, takeoff and landing are especially critical times for the crew to exhibit good judgment and sound decision making. The airplane is close to the ground and there is little room for error during these particular phases of flight.

The FAA provides a range of benefit estimates. The base case estimate only looks at the historical events as an exact mirror for the future. The high case estimate assumes that regional carriers will begin flying larger planes. We understand that future accidents, will not be identical to historical accidents but our approach provides a conservative look at the benefits of this rule based on a snapshot of the past.

Here the FAA provides a quantitative benefit estimate of historical-based accidents (base case), and a high case of expected benefits from future averted accidents once this rule is promulgated. Generally our benefit analysis begins using past history as an important reference from which to begin the benefit analysis. We believe the base case benefit estimate, which is based solely on the outcome of past accidents, may be low because today passenger load factors and aircraft size are already greater than they were in the past decade. On the other hand, we also note that this estimate may not fully take into account changes in regulatory requirements that postdate those accidents and that may mitigate the projected risk. As such, our base case estimate represents a snapshot of risk.

Airplane accidents are somewhat random both in terms of airplane size and the number of people on board. For these reasons, projections of future fatalities may be based on future risk exposure, and our projections are typically based on expected distributions around the mean. Our typical scenario incorporates increasing airplane size, expected load factors, and a breakeven analysis. However, our evaluation of the historical accidents showed a disproportionate risk among smaller, regional carriers. Accordingly, as we discuss below, the FAA has decided to base its high case estimate on preventing an accident in a regional jet airplane.

In response to comments, we have reduced the analysis period from the 20 years provided in the proposed regulatory analysis to 10 years here. We received comments disputing the use of a 20 year time frame for accidents stating the accident rate has declined over time. While noting the wide range of operations over the last 20 years, we shortened the accident history to the last ten years. A reduction in the length of the sample period introduces other problems, most importantly with less time there are fewer observations. Observations are important, as the nature of aviation accidents is that while they are rare events, very often these accidents result in severe, high consequences.

The FAA Office of Accident Investigation assessed the effectiveness of this rule to prevent the 6 fatigue-related accidents which occurred on passenger-carrying aircraft in a recent ten year period. This office used the Commercial Aviation Safety Team (CAST) methodology to assign a value to how effective the rule will be at preventing each accident. On average, we expect this rule would have been 52.5 percent effective in preventing the types of accidents had it been in effect over the last 10 years.

Base Case Estimate

The base case estimate only looks at the historical events as a specific reference point. In this estimate the exact number of fatalities for each past event is multiplied by the relative rule effectiveness score to obtain the historical number of deaths that would have been averted with the requirements contained in this final rule, had this rule been in effect at the time. The base case estimate supposes roughly six deaths will be averted annually. Multiplying six annual averted deaths by the $6.2 million value of statistical life equals $37 million annually. In addition, had the requirements been in place at the time of these historical accidents, $2 million in hull damage for each accident would have been averted, which equals $6 million for ten years or $0.6 million annually. When summed over the ten year period of analysis, the base case estimate is $376 million ($247 million present value at 7% and $311 million present value at 3%).

High Case Estimate

Because airplane accidents are relatively rare they are not necessarily representative of actual risk, especially with regard to airplane size and the number of people on-board. In addition, future conditions will be different than they were when the accident occurred. Thus, the base case represents a snapshot of the risk that fatigue introduces in the overall operating environment. It considers neither the forecasted increase in load factors nor the larger aircraft types. The future preventable events that this rule addresses will not exactly mirror the past events because the airplane types, utilization, and seating capacity have changed.

To quantify the expected benefits in the high case scenario, we narrowed the analysis to three of the six historic accidents which were catastrophic (all on board died). In this case the expected number of preventable catastrophic accidents equals the three accidents multiplied by the 52.5 percent effectiveness rate. Thus over a ten-year time period the expected number of preventable accidents is 1.575. Using the Poisson distribution there is roughly a 20 percent chance for no accident; however, there is also a 50 percent probability of two or more accidents.

While the 20 year accident history has a broader range of catastrophic accidents, in the shorter ten year historical period all the three catastrophic accidents were on regional airplanes. We recognize that as regional airplanes are smaller than the 'typical' passenger jet, assuming all future accidents would be on a regional jet understates the relative risk across the fleet of aircraft affected by this rule. It does, however, represent historical accidents and may be somewhat representative actual future risk, since the mainline carriers typically have collective bargaining agreements that are already largely reflective of the requirements of this rule.[18]

The average size airplane in the forecast period is a B737/A320 with an expected number of passengers and crew of 123 given a forecasted 142 seat airplane and a load factor of 83 percent.[19] Even though there was a (relatively large) B757 passenger airplane accident in the 20 year history, if one looks at the past 10 years as truly representative of risk, the preventable accident would likely be on a regional airplane.

For the high case the FAA backed away from a benefit outcome based on mean fleet, flight hours, and occupant numbers because ultimately we were persuaded there was information which could not be ignored by the three regional passenger accidents occurring without a mainline passenger accident. For this reason, we selected an 88 seat regional jet (like an ERJ-175) to be the representative airplane for the high case. This size airplane is also consistent with the fact that regional operators are expected to fly somewhat larger airplanes in the future.

The expected benefit from this high case follows a simple methodology for estimating and then valuing the expected number of occupants in a prevented accident. With a total of 0.3 accidents per year over the ten year period multiplied by the 52.5 percent effectiveness rate, the analysis assumes 0.1575 average accidents per year. The estimated occupant value for each averted accident equals the average number of seats (88) multiplied by the load factor of 77% plus 4 crew members for a total of 72 averted fatalities. Each of these prevented fatalities is

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[18] It is unusual that collective bargaining agreements would closely mirror regulatory requirements. However, flight and duty limitations are unique because they address both safety considerations, which are regulatory in nature, and lifestyle considerations, which are properly addressed in collective bargaining agreements. Because of the impact of collective bargaining agreements on the number of hours that pilots work, those agreements were considered by the FAA in calculating both the costs and benefits of this rule.

[19] Table 6, FAA Aerospace Forecasts Fiscal Years 2011

multiplied by a $6.2 million value of statistical life. The expected value of a preventable accident equals the sum of the averted fatalities at $446.4 million added to the value of the airplane hull loss ($8.15 million replacement value), for a prevented accident benefit of $454.6 million.[20] Over a ten year period the value of preventing the expected 1.575 accidents equals approximately $716 million ($470 million present value at 7% and $593 million present value at 3%).

Benefit Summary

The new requirements in this final rule will eliminate the current rest and duty distinctions between domestic, flag and supplemental operations as the requirements apply universally to all Part 121 certificate holders conducting passenger operations. The sleep science, while still evolving and subject to individual inclinations, is clear in a few important respects: most people need eight hours of sleep to function effectively, most people find it more difficult to sleep during the day than during the night, resulting in greater fatigue if working at night; the longer one has been awake and the longer one spends on task, the greater the likelihood of fatigue; and fatigue leads to an increased risk of making a mistake. The requirements contained in this final rule and the accompanying analysis are designed reduce the factors that lead to fatigue in most individuals and for all flight crew.

The actual benefits of the final rule will depend upon the type and size of accident that the rule averts. Because we recognize the potential variability in the quantified benefits of this

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[20] In contrast, the value of an averted all-cargo fatal accident would range between $20.35 million (loss of hull and 2 crewmembers) and $32.55 million (loss of hull and 4 crewmembers).

final rule, we provide a base case estimate, and a high case estimate. We also note that preventing a single catastrophic accident in a 10-year period with 61 people on board would cause this rule to be cost beneficial. Our base case estimate is $376 million ($247 million present value at 7% and $311 million at 3%) and our high case estimate is $716 million ($470 million present value at 7% and $593 million at 3%).

Cost Analysis

The cost of the final rule to Part 121 passenger air carriers can be categorized into three main cost components: flight operations, training, and rest facilities. Flight operations cost consists of three main sub-components: crew scheduling cost, computer programming of crew management systems cost, and cost saving associated with the need for fewer reserve flightcrew members. Training cost consists of two main sub-components: dispatchers and management fatigue training cost, and curriculum development cost. Rest facilities cost consists of four main sub-components: engineering cost, installation cost, aircraft downtime cost, and increased fuel usage cost. The final rule costs were calculated using industry-provided data whenever possible, along with expert analysis.

The total estimated cost of the final rule is $390 million for the ten year period from 2013 to 2022. The present value is $297 million and $338 million using a seven percent and a three percent discount rate, respectively. The 2013 effective date of the final rule allows two years for carriers to become compliant with the final rule. The FAA classified costs into three main components and estimated the accompanying costs. Data was obtained from various industry sources; the sources of the data used in cost estimation are explained in each section. Table 6 identifies the three main cost components. Flight operations cost accounts for approximately53 percent of the total present value cost of the rule. Rest facilities account for approximately 43 percent of the total present value cost of the rule. Roughly four percent of the costs contained in this analysis are attributable to training. Each of the main cost components are explained in-depth in the following sections of this document.

Table 6: Cost Summary

Cost Component	Nominal Cost (millions)	PV at 7% (millions)	PV at 3% (millions)
Flight Operations	$236	$157	$191
Rest Facilities	$138	$129	$134
Training	$16	$11	$13
Total	**$390**	**$297**	**$338**

Flight Operations Cost

The flight operations cost component of the final rule is composed of three sub-components: crew scheduling costs, crew management system computer programming costs, and cost savings of reduced reserves due to reducing fatigue. Table 7 provides a summary of the three sub-components of the flight operations cost. The derivations of sub-component costs are explained in-depth in the following sections of the document.[21]

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[21] Operators might be able to reduce their flight operations costs by developing and implementing a fatigue risk management system (FRMS). The FAA is not imposing an FRMS program requirement on Part 121 carriers, but does allow carriers the FRMS option. Carriers might develop an FRMS program as an alternative to the final rule flightcrew member duty and rest requirements when the crew scheduling cost savings equal or exceed the costs of the FRMS program. Carriers might do this for ultra-long flights, which have flight times over 16 hours. FRMS is optional and would only be implemented by an operator if their compliance costs could be reduced as FRMS only provides cost relief. We did not estimate this potential savings as we do not know how many operators would use FRMS and the cost of FRMS has a wide range.

Table 7: Summary of Flight Operations Costs

Flight Operations Cost Sub-Component	Nominal Cost (millions)	PV Cost (millions)
Crew Scheduling	$ 440	$ 289
Computer Programming	$ 8	$ 7
Reducing Fatigue Saving	($ 211)	($ 138)
Total Flight Operations	**$ 236**	**$ 157**

Note: Numbers may not sum to total due to rounding-off error.

Crew Scheduling

Overview

Numerous commenters objected to FAA's assumptions regarding the 25 percent cost-savings resulting from long-term scheduling optimization in the NPRM. To address these concerns, the FAA estimated the scheduling compliance costs using a commercial crew scheduling program. The final rule's impact on crew scheduling costs was evaluated using Cygnus, a pairing and bid line optimizer developed by CrewPairings, Inc.[22]. Part 121 passenger air carriers provided actual crew schedule data to the FAA for assistance in the cost analysis of the Flightcrew Member Duty and Rest Requirements Rulemaking. Each carrier provided data for one or more "cases". A case is defined as a carrier fleet, which usually consists of one aircraft type. In some of the cases, the carrier schedules multiple aircraft types using the same pool of flightcrew members; the methodology in this regulatory impact analysis mirrors actual carrier practice.

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[22] Cygnus has been used by more than 30 major airlines worldwide over the past 40 years.

In total, carriers provided data for eight cases. We believe these are representative of the Part 121 air transportation industry. Mainline passenger carriers were represented with two short-haul, narrow-body aircraft cases and two long-haul, wide-body aircraft cases. Regional passenger carriers were represented with two cases.[23] Cargo carriers were represented with one short-haul, narrow-body aircraft case and one long-haul, wide-body aircraft case.

In addition to the eight cases based on actual carrier fleets, a synthetic supplemental carrier case was created because no supplemental carriers provided crew schedule data. Creation of the synthetic supplemental carrier involved modification of the cargo wide-body case. The flight schedules and crew bases of the cargo wide-body case were retained because cargo carriers consist of the major share of supplemental carriers. The cargo carrier collective bargaining agreement (CBA) rules were replaced with those reflecting a representative supplemental carrier CBA. The representative supplemental carrier CBA reflected rules from a number of actual supplemental carrier CBAs. These changes reflect the impacts of this final rule on actual supplemental passenger carriers operating wide-body aircraft with route structures similar to the cargo carrier wide-body aircraft case.

The crew schedule data consisted of one scheduling period (month) per case. The specific periods varied by carrier, based on data availability. The data included full bid line and pairing information for each flightcrew member, and included both lineholder and reserve flightcrew members.

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[23] Most regional carriers operate code-share flights for a number of mainline partners; crew scheduling is usually performed separately for each mainline partner. This analysis was conducted using the same process as the actual carrier, so each regional carrier case represents a sub-fleet.

The use of a pairing and bid line optimizer enabled the FAA to more accurately model the impacts of the final rule on industry crew scheduling costs than was possible during NPRM cost analysis. The pairing and bid line optimizer has been used worldwide by all types of airlines for their own crew scheduling needs and addresses the optimizer and scheduling limitations in the NPRM cost analysis. Due to this extensive real-world experience, results for these eight cases can be expected to accurately portray the impacts of the final rule on crew scheduling costs for the cases studied, without making assumptions about potential optimization by carriers.

Crew Scheduling Analysis

Accurately analyzing the final rule's impact on crew scheduling costs for the eight cases required isolating the final rule's impact from the impacts of various contractual, management, and discretionary crew scheduling practices. The pairing and bid line optimizer was first calibrated to ensure that it was capable of creating crew schedules identical to the crew schedules provided by the carriers. After calibration, existing federal regulations relevant to flightcrew member scheduling were removed from the optimizer and replaced with the final rule requirement. Changes in crew scheduling cost could then be attributed solely to the final rule.

The first step in optimizer calibration was receiving and formatting the input data from carriers for use in the optimizer. The input data included flight schedules, aircraft flow information, production pairings, regulations, and the carrier's rule set (contractual, management, and discretionary rules) from the carriers' crew management systems. Carrier rule sets included parameters for crew bases, maximum/minimum flight time, rest time, duty time, and ground time to allow aircraft changes. The bid lines and pairings that were received directly from the carriers in this first step are referred to as the "production solution." Since no modifications were made to the production solution by the FAA or the optimizer, the production solution accurately represents the current crew scheduling environment, including all regulatory, contractual, management, and discretionary rules.

Once the production solution was established, the bid lines and pairings were set aside. The optimizer was run using only the flight schedules, aircraft flow information, federal aviation regulations and the carrier's rule set. The optimizer then created its own bid lines and pairings, which are referred to as the "Baseline solution." The Baseline solution was compared to the production solution using a number of metrics, such as the amount of credit hours, duty periods, hotel room nights required, distribution of time among crew bases, number of aircraft swaps, etc. Once the Baseline solution was identical or virtually identical to the production solution, the optimizer was deemed calibrated for each of the cases.

Calibration of the optimizer verified that the optimizer could accurately reproduce the crew scheduling process at each of the carriers. The Baseline solution could be substituted for the production solution at each carrier with no change in crew scheduling cost.

To determine the impact of the final rule, the regulations in the Baseline solution were replaced with the final rule. All provisions of the final rule were implemented in this analysis, including maximum flight time, maximum flight duty time, minimum rest time, and cumulative limits. All other, non-regulatory rules from the Baseline solution were retained. Using these inputs, the optimizer created bid lines and pairings referred to as the "final rule solution."

Since the only difference between the Baseline solution and the final rule solution was the substitution of the final rule for the existing regulations, the change in cost between the solutions is solely attributable to the final rule. Eight industry groups were created for the final rule cost analysis. Three cargo groups were dropped from final rule cost estimates. The two short-haul passenger cases were combined for the passenger narrow-body group. The two long-haul passenger cases were combined for the passenger wide-body group. The two short-haul passenger and two long-haul passenger cases were combined for the passenger integrated group. The two regional cases were combined for the regional group. The synthetic supplemental case was renamed the supplemental group. Table 8 lists the number of flightcrew members per industry group used in the crew pairing analysis, in the determination of the compliance cost for the final rule.

Table 8: Flightcrew Members per Industry Group

Industry Group	Flightcrew Members
Passenger Integrated	4,173
Passenger Narrow-body	2,622
Passenger Wide-body	1,551
Regional	540
Supplemental	806

For each industry group, the change in cost between the Baseline and final rule solutions was divided by the number of flightcrew members in the Baseline solution to determine the monthly final rule crew scheduling cost per flightcrew member for that group. The final rule crew scheduling cost is valued by summing the change in credit hour cost, per diem cost, and hotel cost from the Baseline solution to the final rule solution. The annual final rule crew scheduling cost per flightcrew member was calculated by multiplying the monthly cost by 12. Table 9 presents the monthly and annual final rule cost per flightcrew member for each group.

Table 9: Final Rule Crew Scheduling Cost per Flightcrew Member

Industry Group	Final Rule Monthly Cost per Flightcrew Member	Final Rule Annual Cost per Flightcrew Member
Passenger Integrated	$22	$264
Passenger Narrow-body	$98	$1,176
Passenger Wide-body	-$107	-$1,284
Regional	$84	$1,008
Supplemental	$1,261	$15,133

The final rule crew scheduling cost per flightcrew member in Table 9 includes crew salary, per diem, and hotel costs. Crew salary is calculated by multiplying the change in credit hours from the Baseline solution to the final rule solution by the estimated average credit hour cost per flightcrew member. Estimated average credit hour cost per flightcrew member was calculated using Bureau of Transportation Statistics Form 41 data[24] and other industry data.

Item 51230, Pilots and Copilots, from Schedule P-5.2 was used to determine the total flightcrew cost by carrier and by aircraft type. Block hours by carrier and by aircraft type were taken from the AirHoursRamp item in the Air Carrier Summary Data, T2: U.S. Air Carrier Traffic and Capacity Statistics by Aircraft Type report. Total flightcrew cost data and aircraft block hour data were both summed for each of the five industry groups. The industry group sum of total flightcrew cost was divided by the industry group sum of aircraft block hours for each of the five industry groups. These calculations resulted in the average total flightcrew cost per aircraft block hour.

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[24] Data is from 1Q 2010 through 3Q2010, the most recent data available as of April 2011.

To determine the average cost per block hour for an individual flightcrew member, it was necessary to divide the average total flightcrew cost per aircraft block hour by the average number of flightcrew members per flight. The average number of flightcrew members per flight was estimated using data provided to the FAA by a number of carriers.

Several steps were necessary to convert from the average cost per block hour per flightcrew member to the average credit hour cost per flightcrew member. First, estimated credit hours per flightcrew member per month by industry group were derived from analysis of AIR Inc. Salary Survey data. The AIR Inc. Salary Survey provided estimated credit hours per flightcrew member per month for 29 carriers. Each of these carriers was assigned to one of the industry groups. Weighted average estimated credit hours were calculated using carrier block hour data from Schedule T2: U.S. Air Carrier Traffic and Capacity Statistics by Aircraft Type carrier block hours from the Air Carrier Summary Data database. Next, actual crew scheduling data provided by a number of carriers to the FAA was analyzed to determine the average flightcrew member number of block hours per month for each of the industry groups. Dividing the average flightcrew member block hours per month by the average flightcrew member credit hours per month resulted in a ratio of block hours per month to credit hours per month, for each of the industry groups. The average cost per block hour per flightcrew member was multiplied by the ratio of block hours per month to credit hours per month to result in the average credit hour cost per flightcrew member for each of the industry groups.

The approach to calculating the average credit hour cost per flightcrew member presented in Table 10 addresses NPRM comments made by several commenters. Commenters stated that the salary data used in the NPRM RIA "does not approximate current, real world flight crew unit costs…"[25] ATA suggested that the FAA use DOT Form 41 data for calculation of crew salary costs. The approach to crew salary costs presented in Table 10 responds to this comment by using the most recent 2010 DOT Form 41 data available as of April 2011 for the calculation of average credit hour costs per flightcrew member. This approach does not include payroll taxes because these represent a transfer cost. This approach also does not include pension and benefit costs, because these costs will not be affected by the marginal change in credit hours attributable to the final rule.

Table 10: Average Flightcrew Member Cost per Credit Hour

Industry Group	Average Flightcrew Cost per Block Hour	Average Flightcrew Members per Flight	Average Flightcrew Member Cost per Block Hour	Weighted Average Estimated Credit Hrs/Month	Average Flightcrew Member Block Hrs/Month	Ratio of Credit Hrs/Month to Block Hrs/Month	Average Credit Hour Cost per Flightcrew Member
Passenger Integrated	$481	2.24	$214	78	59	0.76	**$163**
Passenger Narrow-body	$417	2.00	$209	82	60	0.73	**$153**
Passenger Wide-body	$629	2.67	$236	60	59	0.98	**$231**
Regional	$179	2.00	$89	82	48	0.59	**$53**
Supplemental	$712	2.16	$329	71	44	0.61	**$201**

Table 10 summarizes the steps used to calculate the average monthly credit cost per flightcrew member. First, the number of flightcrew members in the Baseline solution of each case was summarized by industry group. Next, the change in credit hours from the Baseline solution to the final rule solution was calculated. The result was multiplied by the average

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[25] Comments of the Air Transport Association of America, Inc. in the matter of Notice of Proposed Rulemaking for Flightcrew Member Duty and Rest Requirements, Docket No. FAA-2009-1093, November 15, 2010.

flightcrew member cost per credit hour[26] to calculate the final rule credit hour cost. The final rule credit hour cost per flightcrew member was necessary to have for extrapolation of the crew scheduling cost to the industry; this was calculated by dividing the final rule credit hour cost by the number of flightcrew members in the Baseline solution and is shown in Table 11.

Table 11: Average Monthly Credit Hour Cost per Flightcrew Member Calculation

Industry Group	Baseline Solution Flightcrew Members	Change in Credit Hours from Baseline Solution to Final Rule Solution	Average Flightcrew Member Cost per Credit Hour	Final Rule Credit Hour Cost	Final Rule Credit Hour Cost per Flightcrew Member
Passenger Integrated	*4,173*	*723*	*N/A*	*$29,854*	***$7***
Passenger Narrow-body	2,622	1,758	$153	$268,664	**$102**
Passenger Wide-body	1,551	-1,035	$231	-$238,809	**-$154**
Regional	540	94	$53	$4,953	**$9**
Supplemental	806	4,642	$201	$930,922	**$1,155**

Note: The passenger integrated group is the combined passenger narrow-body and passenger wide-body groups.

Per-diem costs were calculated by multiplying the change in time away from base (TAFB) from the Baseline solution to the final rule solution by the appropriate per diem rate. Because flightcrew members at some carriers receive different per diem rates based on whether TAFB is domestic or international, the pairings summary in each of the solutions provided domestic and international TAFB separately. The per diem rates used in this analysis were a weighted average of carriers reporting per diem rates in the 2006-07 AIR, Inc. Salary Survey. The data was categorized by operator type (freight, passenger, and regional) since per diem rates

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[26] Average flightcrew member cost per credit hour calculation is shown in Table 10.

do not differ by aircraft type operated. Weighted averages were calculated using T2: U.S. Air Carrier Traffic and Capacity Statistics by Aircraft Type carrier block hours from the Air Carrier Summary Data database. Table 12 shows the weighted average hourly per diem rates by operator type used in this analysis.

Table 12: Hourly Per Diem Rates by Operator Type

Operator Type	Weighted Average Domestic Per Diem Rate	Weighted Average International Per Diem Rate
Passenger	$1.94	$2.28
Regional	$1.60	$1.99
Supplemental	$2.06	$2.28

Table 13 summarizes the steps used to calculate the average monthly domestic per diem cost per flightcrew member. First, the number of flightcrew members in the Baseline solution of each case was summarized by industry group. Next, the change in domestic TAFB hours from the Baseline solution to the final rule solution was calculated. The result was multiplied by the weighted average domestic per diem rate to calculate the final rule domestic per diem cost. The final rule domestic per diem cost per flightcrew member was necessary to have for extrapolation of the crew scheduling cost to the industry; this was calculated by dividing the final rule domestic per diem cost by the number of flightcrew members in the Baseline solution.

Table 13: Average Monthly Domestic Per Diem Cost per Flightcrew Member Calculation

Industry Group	Baseline Solution Flightcrew Members	Change in Domestic TAFB Hours from Baseline Solution to Final Rule Solution	Weighted Average Domestic Per Diem Rate per Hour	Final Rule Domestic Per Diem Cost	Final Rule Domestic Per Diem Cost per Flightcrew Member
Passenger Integrated	4,173	7,488	$1.94	$14,557	**$3**
Passenger Narrow-body	2,622	3,625	$1.94	$7,048	**$3**
Passenger Wide-body	1,551	3,863	$1.94	$7,510	**$5**
Regional	540	9,960	$1.60	$15,972	**$30**
Supplemental	806	3,159	$2.06	$6,509	**$8**

Table 14 summarizes the steps used to calculate the average monthly international per diem cost per flightcrew member. First, the number of flightcrew members in the Baseline solution of each case was summarized by industry group. Next, the change in international TAFB hours from the Baseline solution to the final rule solution was calculated. The result was multiplied by the weighted average international per diem rate to calculate the final rule international per diem cost. The final rule international per diem cost per flightcrew member was necessary to have for extrapolation of the crew scheduling cost to the industry; this was calculated by dividing the final rule international per diem cost by the number of flightcrew members in the Baseline solution.

Table 14: Average Monthly International Per Diem Cost per Flightcrew Member Calculation

Industry Group	Baseline Solution Flightcrew Members	Change in International TAFB Hours from Baseline Solution to Final Rule Solution	Weighted Average International Per Diem Rate per Hour	Final Rule International Per Diem Cost	Final Rule International Per Diem Cost per Flightcrew Member
Passenger Integrated	4,173	6,637	$2.28	$15,120	**$4**
Passenger Narrow-body	2,622	1,030	$2.28	$2,346	**$1**
Passenger Wide-body	1,551	5,607	$2.28	$12,774	**$8**
Regional	540	-16	$1.99	-$31	**$0**
Supplemental	806	9,759	$2.28	$22,270	**$28**

The final rule domestic per diem cost per flightcrew member column from Table 13 and the final rule international per diem cost per flightcrew member column from Table 14 were summed to calculate the final rule per diem cost per flightcrew member. The results are shown in Table 15.

Table 15: Average Monthly Per Diem Cost per Flightcrew Member

Industry Group	Final Rule Domestic Per Diem Cost per Flightcrew Member	Final Rule International Per Diem Cost per Flightcrew Member	Final Rule Per Diem Cost per Flightcrew Member
Passenger Integrated	$3	$4	**$7**
Passenger Narrow-body	$3	$1	**$4**
Passenger Wide-body	$5	$8	**$13**
Regional	$30	$0	**$30**
Supplemental	$8	$28	**$36**

Hotel costs were calculated by multiplying the change in required hotel room nights from the Baseline solution to the final rule solution by the average hotel room cost. The hotel room costs used in this analysis were included in data provided to the FAA and differ by carrier. Table 16 summarizes the final rule monthly hotel cost per flightcrew member by industry group.

Table 16: Cost Components of Monthly Final Rule Cost per Flightcrew Member

Industry Group	Final Rule Monthly Credit Cost per Flightcrew Member	Final Rule Monthly Per Diem Cost per Flightcrew Member	Final Rule Monthly Hotel Cost per Flightcrew Member	Final Rule Monthly Cost per Flightcrew Member
Passenger Integrated	$7	$7	$8	**$22**
Passenger Narrow-body	$102	$4	-$8	**$98**
Passenger Wide-body	-$154	$13	$34	**-$107**
Regional	$9	$30	$46	**$84**
Supplemental	$1,155	$36	$70	**$1,261**

Extrapolation of Crew Scheduling Analysis

All Part 121 passenger air carriers in the U.S. air transport industry were categorized into one of the five industry groups based on how closely the carrier resembled one of the five industry groups. A number of metrics such as operating authority, aircraft fleet, aircraft utilization, markets served, collective bargaining agreements, etc. were examined to determine which of the five industry groups each carrier most closely resembled. Table 17 lists the number of air carriers in each group and the number of flightcrew members in each group.

Table 17: Final Rule Cost Analysis Industry Groups

Industry Group	Part 121 Carriers	Flightcrew Members
Passenger Integrated	7	36,013
Passenger Narrow-body	16	12,128
Passenger Wide-body	1	150
Regional	40	20,668
Supplemental	3	1,267
Total	**67**	**70,226**

Source: Adapted from FAA VIS, December 2010

The number of flightcrew members presented in Table 17 reflects the number of flightcrew members listed on each Part 121 carrier's operating certificate in the FAA's Vital Information Subsystem (VIS) as of December 2010. The total industry final rule cost would be overstated if extrapolation was based on the number of VIS flightcrew members because not all of these flightcrew members are lineholders. Each carrier employs a significant number of reserve flightcrew members. The FAA estimated that reserves comprise 15 percent of flightcrew members for the average Part 121 passenger air carrier based on APA published information[27]. Thus, the extrapolation of the crew scheduling analysis to the Part 121 passenger air transportation industry used the number of flightcrew members (lineholders) shown in Table 18 to determine the final rule crew scheduling cost.

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[27] "The Reserve System – A Quality of Life Nightmare," page 16, Flightline, Allied Pilots Association, December 2010/January 2011.

Table 18: Reserve-Adjusted Flightcrew Members by Industry Group

Industry Group	Flightcrew Members Adjusted for Reserves
Passenger Integrated	30,611
Passenger Narrow-body	10,309
Passenger Wide-body	128
Regional	17,568
Supplemental	1,077
Total	**59,692**

Note: Numbers may not sum to total due to rounding-off error.

The number of flightcrew members in each industry group shown in Table 18 was multiplied by the appropriate annual cost per flightcrew member (Table 16) to extrapolate the estimated cost to the Part 121 passenger air transportation industry, as shown in the "Preliminary Annual Crew Scheduling Cost" column in Table 19. In 2010, there were eight Part 121 carriers that conducted both all-cargo and passenger operations. For those carriers, the number of passenger revenue departures as a share of total revenue departures in 2010 as reported in Database T1: U.S. Air Carrier Traffic and Capacity Summary by Service Class from the Bureau of Transportation Statistics was used as the share of crew scheduling costs attributable to the final rule. The "Final Annual Crew Scheduling Cost: Adjusted for Passenger Flights Only" column in Table 19 presents the annual, nominal crew scheduling costs by industry group.

Table 19: Annual Crew Scheduling Costs

Industry Group	Final Rule Annual Cost per Flightcrew Member	Reserve-Adjusted Flightcrew Members	Preliminary Annual Crew Scheduling Cost (millions)	Final Annual Crew Scheduling Cost Adjusted for Passenger Flights Only (millions)
Passenger Integrated	$264	30,611	**$8**	**$8**
Passenger Narrow-body	$1,176	10,309	**$12**	**$12**
Passenger Wide-body*	-$1,284	128	**$0**	**$0**
Regional	$1,008	17,568	**$18**	**$18**
Supplemental	$15,133	1,077	**$16**	**$7**
Total	**N/A**	**59,692**	**$54**	**$44**

* Some flights that currently require four flightcrew members could be completed with three flightcrew members under the final rule.

Note: Numbers may not sum to total due to rounding-off error.

Table 20 presents the nominal and present value (at seven percent discount rate) crew scheduling cost for the entire passenger-carrying portion of the industry for each year of the ten year period of analysis[28]. Each table contains all crew scheduling cost components, including crew salary, per diem, and hotel costs.

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[28] The projected cost for all-cargo operators associated with crew scheduling was $286 million over 10 years in nominal costs and $188 million in present value costs.

Table 20: Ten Year Crew Scheduling Costs

Year	Nominal Cost (millions)	PV Cost (millions)
2014	$ 44	$ 38
2015	$ 44	$ 36
2016	$ 44	$ 34
2017	$ 44	$ 31
2018	$ 44	$ 29
2019	$ 44	$ 27
2020	$ 44	$ 26
2021	$ 44	$ 24
2022	$ 44	$ 22
2023	$ 44	$ 21
Total	**$ 440**	**$ 289**

Note: Numbers may not sum to total due to rounding-off error.

Limitations of Crew Scheduling Analysis

The FAA believes that carriers will be able to reduce much of the cost shown in Table 20. Carriers will engage in additional network optimization to reduce crew scheduling costs, which the FAA is unable to quantify at this point. In the long run, this may involve re-timing flights, changing schedule frequency, and entering or leaving markets. However, there may also be costs associated with these actions such as changes in aircraft utilization and revenue losses. At this time, the FAA has not estimated potential long-run optimization of crew scheduling costs.

The final rule economic costs are best measured as society's willingness to be compensated for consumption opportunities forgone as a result of resources being diverted to the production of improved aviation safety. Because these opportunity costs are difficult to estimate, our estimates of crew scheduling costs reflect, for the most part, financial costs that will be incurred by affected air carriers. These financial costs are likely to overstate the economic costs of the proposed rule.

A large part of estimated crew scheduling costs is increased compensation to flightcrew members for the additional time spent in avoiding pilot fatigue. These compensation costs will reflect economic costs only if flightcrew wage rates are accurate measures of the forgone value of goods and services that could otherwise be produced. However, it is likely that flightcrew members will be able to use some of the time spent avoiding fatigue in productive activities, including the production of leisure activities. Our cost estimates do not include offsets for the value of these activities.

Increased per diem cost estimates do not include offsets that are likely to occur. For example, meals consumed on the road by flight crew members are substitutes for meals that would otherwise be consumed at home. Resource savings (the value of labor and food used to produce meals at home in this example) are not reflected in our cost estimates. Similarly, the costs associated with increased hotel expenses do not include offsets for at-home savings that will likely occur—e.g., reduced energy and water consumption and avoided cleaning costs.

Computer Programming

Carriers will incur computer programming costs as they will need to update their crew management systems and their schedule optimization systems with the constraints imposed by the final rule.

A one-time cost will be incurred in 2013 as carriers update their crew management systems. Crew management system update costs were estimated for each individual carrier, based on the number of flightcrew members listed on the carrier's operating certificate.

Carriers were assigned to one of three groups based on the number of flightcrew members. Costs vary with size of carriers, estimated by the number of person-days and staff costs. Person-days required to perform the system update were estimated about 400, 160 and 80 days for large (more than 1,000 flightcrew members), average (250 to 1,000 flightcrew members) and small (less than 250 flightcrew members) carriers, respectively. A daily professional staff cost was estimated approximately $625. Table 21 presents the nominal and present value of crew management system update costs[29].

Table 21: Crew Management System Update Costs

Year	Flightcrew Members	Carriers	Cost per Carrier	Nominal Cost (millions)	PV Cost (millions)
2014	>1,000	16	$250,000	**$ 4**	**$ 3**
	250-1,000	21	$100,000	**$ 2**	**$ 2**
	<250	30	$50,000	**$ 2**	**$ 1**
Total		**67**		**$ 8**	**$ 7**

Note: Numbers may not sum to total due to rounding-off error

Cost Savings from Reducing Flightcrew Members Fatigue

The final rule is designed to reduce the risk of fatigued flightcrew members by limiting the maximum number of hours they are permitted to be on duty, the number of hours they actually fly during duty periods, and by ensuring that they receive adequate rest periods before

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[29] The projected cost for all-cargo operations associated with computer programming was $2 million in nominal cost and $1 million in present value cost.

reporting for duty. According to CDC, “chronic sleep loss is an under-recognized public health problem that has a cumulative effect on physical and mental health. Sleep loss and sleep disorders can reduce quality of life and productivity, increase use of health-care services, and result in injuries, illness, or deaths.”[30] It is expected that the final rule will result in better-rested flightcrew members, and reduce wage loss. The final rule will reduce flight crew member fatigue, thus reducing the use of sick time. When a flightcrew member is scheduled for duty and calls in sick or fatigued, the carrier must use a reserve flightcrew member to complete the scheduled duty. The final rule will reduce the use of reserve flightcrew members to cover fatigue-induced sick call-ins by flight crew members, which will reduce the flight operations cost associated with fatigue issues for carriers.

While the precise share of current sick time attributable to fatigue is unknown, it is most likely greater than zero. Similarly, while the precise amount by which the final rule will reduce sick time is unknown, it is also most likely greater than zero. Labor representatives have informed the FAA that the estimated sick time that is used due to fatigue is approximately five percent. In light of this information, the FAA assumes, for the purposes of this analysis, that sick time accounts for five percent of total industry flightcrew member pay. Total industry flightcrew member pay was calculated by multiplying the average flightcrew member cost per credit hour from Table 10 by the estimated number of credit hours per month[31] and multiplied by 12 for each carrier to calculate total annual industry flightcrew member pay.

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[30] CDC’s MMWR, Weekly, February 29, 2008 / 57(08);200-203.

[31] Estimated number of credit hours per month by carrier was taken from the 2006-07 U.S. Airlines/Corporate Salary Survey published in AIR Inc.

In 2010, there were eight Part 121 carriers that conducted both all-cargo and passenger operations. For those carriers, the number of passenger revenue departures as a share of total revenue departures in 2010 as reported in Database T1: U.S. Air Carrier Traffic and Capacity Summary by Service Class from the Bureau of Transportation Statistics was used as the share of cost savings attributable to the final rule.

The final rule is expected to reduce the use of sick time by five percent. The nominal value of the cost savings is approximately $211 million ($138 million present value) over the ten-year period of analysis.[32] Table 22 presents the annual cost savings.

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[32] The projected cost savings to all-cargo operators was estimated at $48 million nominal value over 10 years and $32 million in present value.

Table 22: Reducing Flightcrew Members Fatigue Cost Savings

Year	Nominal Cost Savings (millions)	PV Cost Savings (millions)
2014	$ 21	$ 18
2015	$ 21	$ 17
2016	$ 21	$ 16
2017	$ 21	$ 15
2018	$ 21	$ 14
2019	$ 21	$ 13
2020	$ 21	$ 12
2021	$ 21	$ 11
2022	$ 21	$ 11
2023	$ 21	$ 10
Total	**$ 211**	**$ 138**

Note: Numbers may not sum to total due to rounding-off error

Flight Operations Cost Summary

The total flight operations cost is composed of the additional crew scheduling costs (flightcrew member salary, hotel, and per diem), plus the computer programming costs, and less the cost savings from reducing flightcrew members fatigue. The net nominal value of the total flight operations cost for the period of analysis is approximately $236 million, with a present value of $157 million[33]. Table 23 presents the annual nominal and present value total flight operations cost.

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[33] The projected cost to all-cargo operators associated with flight operations is $240 million in nominal cost over 10 years and $158 million in present value.

Table 23: Total Flight Operations Cost

Year	Nominal Cost (millions)	PV Cost (millions)
2014	$ 30	$ 27
2015	$ 23	$ 19
2016	$ 23	$ 17
2017	$ 23	$ 16
2018	$ 23	$ 15
2019	$ 23	$ 14
2020	$ 23	$ 13
2021	$ 23	$ 12
2022	$ 23	$ 12
2023	$ 23	$ 11
Total	**$ 236**	**$ 157**

Note: Numbers may not sum to total due to rounding-off error.

Rest Facilities

The final rule establishes maximum flight-duty period limits for augmented operations that are dependent on the start time of the flight duty period, the number of flightcrew members assigned to the flight, and the class of rest facility installed on the aircraft. The final rule establishes detailed specifications for each of the three classes of rest facilities. Class 1 rest facilities are most conducive to reducing the risk of fatigue in augmented operations; accordingly, the maximum flight duty time permitted for augmented operations conducted with Class 1 rest facility-equipped aircraft is greater than the maximum flight duty time permitted for augmented operations conducted with either Class 2 or 3 rest facility-equipped aircraft. The definitions of the rest facilities are as follows:

- A Class 1 rest facility is a bunk or other surface that allows for a flat sleeping position and is located separate from both the flight deck and passenger cabin in an area that is temperature-controlled, allows the crewmember to control light, and provides isolation from noise and disturbance.
- A Class 2 rest facility is a seat in an aircraft cabin that allows for a flat or near flat sleeping position; is separated from passengers by a minimum of a curtain to provide darkness and some sound mitigation; and is reasonably free from disturbance by passengers or crewmembers.
- A Class 3 rest facility is a seat in an aircraft cabin or flight deck that reclines at least 40 degrees and provides leg and foot support.

There are four sub-components of the rest facility cost component of the final rule. The first sub-component consists of the rest facility design and engineering costs. The second sub-component consists of the cost resulting from the physical installation of the facilities on the affected aircraft. The third sub-component is the value of the aircraft downtime required to install the rest facilities. The final sub-component is additional aircraft fuel consumption cost due to the weight of the rest facilities. The following paragraphs discuss how the FAA estimated each of the rest facility cost sub-components, and Table 24 details the final cost of each of these sub-components. The total rest-facility cost is approximately $138 million ($129 million present value[34].)

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[34] We assumed costs of engineering, installation and downtime incur in two years prior to the compliance of the final rule and fuel cost incurs for a 10-year period.

Table 24: Rest Facility Cost Overview

Rest Facilities Cost Sub-Component	Nominal Cost (millions)	PV Cost (millions)
Engineering	$ 12	$ 11.5
Installation	$ 99	$ 96
Downtime	$ 12	$ 11.5
Fuel	$ 15	$ 10
Total Rest Facilities	**$ 138**	**$ 129**

Engineering

During NPRM cost analysis, the FAA obtained detailed cost estimates from two supplemental type certificate (STC) holders. For this final regulatory evaluation we have delineated between engineering and kit/installation costs, as the engineering cost per operator would be a one-time, non-recurring cost for each type (make and model) of aircraft. We continue using the data provided by the STC holders as the basis for engineering and installation. The engineering costs are non-recurring, design costs. These consist of system, development, engineering, analysis, and certification costs. We conservatively use the engineering cost of $0.5 million per make/model as estimated by the STC holders. Accordingly, there will be roughly 24 different designs at $0.5 million per design (make/model). The actual engineering cost will not be incurred until 2014, one year after the implementation of the rule (2013) because the final payment will not occur until successful demonstration of the STC on all of the aircraft. As such, the estimated engineering cost is approximately $12 million ($0.5 million x 24), or $11.5 million present value at 7% discount rate.

Installation

Based upon public comments in response to the NPRM, the FAA has refined the estimate of the number of aircraft that will require rest facility installation. The FAA now estimates, based on data collected from FAA inspectors, that 223 aircraft will need crew rest modifications to comply with the final rule.[35] This is an increase from the estimate of 104 aircraft in the NPRM cost analysis. However, it is lower than the estimates of some NPRM commenters. The FAA believes that the final rule estimate of 223 aircraft represents the worst case scenario because aircraft will be re-optimized based upon current configurations. The FAA estimates that, any additional aircraft, beyond the approximate 223 aircraft used in this analysis, will already have adequate rest facilities. Once the additional 223 aircraft have rest facilities installed, each fleet will be re-optimized for the most efficient use. As such, we conservatively assume all of these 223 aircraft will have a Class 1 facility installed for an upper-bound estimation.

We continue to use the equipment and labor cost provided by an STC holder for our estimate of installation costs to the carriers. The kit and the installation for each of the individual airplanes will cost roughly $350,000 and $95,000, respectively. As such, the total cost of each installation will be roughly $445,000 ($350,000 + $95,000). When multiplied by the affected fleet of 223 aircraft, the total facility installation cost will be approximately $99 million ($445,000 x 223), or $96 million present value at 7% discount rate.

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[35] All aircraft used in augmented operations by carriers conducting both all-cargo and passenger operations are included in this analysis, since it is not possible to identify whether aircraft are used exclusively in all-cargo operations.

Downtime

Commenters indicated that an aircraft could be out of service for two weeks during rest facility installation. The FAA estimates the cost to Part 121 operators for this potential additional planned time out of service, or *downtime,* to install the rest facilities. STC designers have indicated that with proper planning, a modifier can install rest facilities in two to four days. We conservatively use a four-day estimate for the calculation of the downtime cost. The FAA conservatively assumes that if an aircraft was to be out of service for any part of a day, that airplane would be out of service for the entire day.

For this analysis, the FAA uses the opportunity cost of capital to approximate the planned downtime cost to the operators. Using guidelines prescribed by the Office of Management and Budget, the FAA uses seven percent as a proxy for average annual rate of return on capital. The FAA uses $69 million as the estimated market value of an aircraft[36] for downtime in this analysis. The yearly opportunity cost of capital per aircraft would be $4.83 million, roughly $13,233 per day. When multiplied by the affected fleet (223 aircraft) and the days out of service (4 days), the downtime cost for the fleet is $12 million (223 x 4 x $13,233), or $10 million present value.

Fuel Consumption Costs

We have analyzed the costs associated with the design and installation of Class 1 rest facilities. We assume the rest facilities will be installed in the most efficient manner possible, with no impact on passenger seats or the revenue that they generate. As such, we do not estimate

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[36] November, 2010 The Airline Monitor. This number represents the appraised value of a 767-300. p.33

loss of revenue from a Class 1 rest facility, because as defined by the rule, the facilities will be located separate from both the flight deck and passenger cabin, and will not necessarily require the removal of passenger seats. For example, a Class 1 rest facility can be located in aircraft belly or overhead area, neither of which requires the removal of passenger seats. Although there will be no revenue impact, there will be an additional cost that will add to the aircraft operating costs due to the estimated additional impact of weight changes on each aircraft. Estimates for the additional incremental weight impact are used to calculate the additional fuel consumption for the affected fleet.

The estimated cost of fuel reflects the most recent forecast using data from the 2011 FAA Aerospace Forecast. We use the fuel consumption methodology as derived from the FAA's guidance, Economic Values for the FAA Investment and Regulatory Decisions along with the estimated average fuel cost of approximately $2.85 per gallon. To calculate the additional annual cost of fuel per aircraft, we multiply the 300 additional pounds by the fuel consumption factor of .005 gallons per hour per pound (consistent with a two-engine, wide-body aircraft) and arrive at 1.5 gallons per hour per aircraft. This product is then multiplied by the average annual flight hours per aircraft of 2,380[37] and finally by the cost of fuel ($2.85) to arrive at the total annual estimated additional cost of fuel per aircraft of $6,763. When multiplied by the affected annual fleet (223 aircraft), the annual incremental fuel consumption cost is approximately $1.5 million. When summed over the period of analysis, the total estimated cost for fuel is approximately $15 million (1.5 x 2,380 x 223 x $2.85 x 10) or $10 million present value.

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[37] DOT, Form 41

Fatigue Training

In accordance with the Airline Safety and Federal Aviation Administration Extension Act of 2010, Section 212, each air carrier conducting operations under 14 CFR part 121 must have submitted a fatigue risk management plan (FRMP) to the Administrator for review and acceptance. A FRMP is an air carrier's management plan outlining policies and procedures for reducing the risks of flightcrew memberı fatigue and improving flightcrew member alertness. In this final rule the FAA kept the requirement for pilots to receive fatigue training, but eliminated the incremental cost of compliance because the operators are already in compliance with FRMP. The final keeps the requirement for management and dispatchers to have fatigue training and the requirement for curriculum development and keeps the costs for these requirements. Again, the FAA made this change as air carriers under 14 CFR part 121 will be in compliance with the statutory pilot training requirement as part of the FRMP's. This rule change reduces the nominal training cost requirement to $16 million.

The final rule requires that dispatchers and upper management having operational control over flightcrew members be given fatigue training. The number of dispatchers in the U.S. air transportation industry is equal to approximately three percent of the number of pilots. The number of management personnel (immediate supervisors and schedulers) is estimated to be about nine percent of flightcrew members. Therefore, the total number of dispatchers and management personnel required to receive fatigue training is estimated to be approximately 12 percent of total flightcrew members.

The estimated total cost of the proposed fatigue training requirements for dispatchers and management personnel over the ten year period from 2013 to 2022 is $16 million or $11 million in present value.

In addition carriers will incur a one-time cost to develop fatigue training curriculum. According to industry standard, curriculum development takes three hours for each hour of course required. Therefore, the time needed to develop the initial training curriculum will be fifteen hours and the time needed to develop the recurrent training curriculum will be six hours. The FAA assumes that the wage rate of the curriculum developer is approximately $100 per hour. Each of the 67 Part 121 passenger air carriers will need to develop its own curriculum. The total cost of curriculum training is $140 thousand or $120 thousand in present value.

Thus the training cost requirement for management and dispatchers plus curriculum development cost equals $16 million and $11 million in present value.

Cost Analysis Summary

The present value cost of the final rule to Part 121 passenger air carriers over the ten-year period of analysis is $390 million ($284 million present value). Flight operations account for approximately 53 percent of the nominal total cost; crew scheduling cost is the largest sub-component of flight operations cost. Rest facilities account for roughly 43 percent of the nominal total cost; rest facility installation is the largest sub-component of rest facilities cost. Roughly 4 percent of the nominal cost of the final rule is attributable to training. All final rule cost components were calculated using industry-provided data whenever possible, along with expert analysis.

Table 25: Cost Summary

Cost Component	Nominal Cost (millions)	PV at 7% (millions)	PV at 3% (millions)
Flight Operations	$236	$157	$191
Rest Facilities	$138	$129	$134
Training	$16	$11	$13
Total	**$390**	**$297**	**$338**

Note: Numbers may not sum to total due to rounding-off error.

Cost-Benefit Summary

The total estimated cost of the final rule over 10 years is $390 million ($297 million present value at 7% and $338 million at 3%).[38] We provide a range of estimates for our quantitative benefits over the same period. Our base case estimate is $376 million ($247 million present value at 7% and $311 million at 3%) and our high case estimate is $716 million ($470 million present value at 7% and $593 million at 3%). We also note that preventing a single catastrophic accident in a 10-year period with 61 people on board would cause this rule to be cost beneficial.

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[38] The projected cost for all-cargo operations is $306 million ($214 million present value at 7% and $252 million at 3%). The projected benefit of avoiding one fatal all-cargo accident ranges between $20.35 million and $32.55 million, depending on the number of crewmembers on board the aircraft.

Accident Appendix

1. Accident DCA94MA065

Date: 7/2/1994

July 2, 1994 in Charlotte, NC

A/C: MD-82, N954VJInjuries: 37 Fatal, 16 Serious

Accident Summary: Aircraft collided with trees and a private residence near the Charlotte/Douglas International Airport, Charlotte, North Carolina (CLT), shortly after the flightcrew executed a missed approach from the instrument landing system (ILS) approach to runway

Probable Cause: Probable cause was determined to be the flightcrew's decision to continue an approach into severe convective activity that was conducive to a microburst: 2) the flightcrew's failure to recognize a windshear situation in a timely manner, 3) the flightcrew's failure to establish and maintain the proper airplane attitude and thrust setting necessary to escape the windshear; and 4) the lack of real-time adverse weather and windshear hazard information dissemination from air traffic control, all of which led to an encounter with and failure to escape from a microburst-induced windshear that was produced by a rapidly developing thunderstorm located at the approach end of runway.

Flight Crew/Fatigue Related Information: The captain was off duty for 3 days before the beginning of the accident trip. On the morning of June 28, 1994, he flew with his National Guard squadron, which is based at Wright Patterson Air Force Base Ohio, near his home. On the day of the accident he awoke about 0455 drove to the airport in Dayton Ohio, and departed on a flight to Pittsturgh at around 0745. The reporting time for the trip that included the accident flight was 0945, and the departure time for LGA was at 1045. The first officer flew a 4-day trip that ended around 0930 on July 2. On the day of the accident, he arose about 06 I5 and flew the leg to Pittsburgh that departed St. Louis at 0810. He arrived in Pittsburgh at 0030.

SCORE: 0.35 Fatigue could have affected FO's performance (PF). PIC, who was off-duty preceding 3 days, was much less vulnerable to fatigue, but he too had already had a long day. Accident occurred 14 hours into PIC's day. He awoke at 0455, drove to Dayton from home, then flew to PIT to begin duty day. Accident occurred at 1843, at end of third of 4 scheduled legs. His long day may have contributed to his failure to make 2 standard call-outs on approach at 1000 AGL & 100 AGL. As NTSB notes, failure to make these call-outs contributed to PIC's loss of situational awareness, his directing FO to go-around "to the right" instead of following runway heading as directed, & directing FO to "push down" after FO had initiated 15-degree nose-up & right banking turn.

FO was more vulnerable to fatigue. His duty day ended June 30 at 2230 at Blountsville, TN. NTSB report does not say when that duty day began, nor when FO awoke that day. At Blountville, he went to bed at 0130 & awoke at 0900. His next duty day ended at STL at 2040 EDT. He went to bed at 2230 & awoke at 0615 on accident day. He then flew to PIT & began pairing with accident PIC. Like PIC, FO was nearly 14 hours into his day when accident occurred. He was PF on PIT-LGA leg & on accident leg from CAE. Fatigue could have contributed to incomplete pre-flight brief, failure to maintain sterile cockpit below 10,000 feet, approach briefing in which he omitted field elevation, FAF altitude, DH, & MAP altitudes, all of which NTSB noted had contributed to lack of situational awareness by both pilots. Finally, all the above contributed to crew's choice to initiate non-standard go-around. Other factors were important, including ATC performance, A/C's inadequate windshear algorithm, & abnormally severe windshear. In short, hard to justify a high score, but equally hard to argue that fatigue was irrelevant.

2. Accident DCA95MA020

Date: 2/16/1995

NTSB Identification: DCA95MA020, Air Transport International

February 16, 1995 in Kansas City, MO

A/C: DC-8-63, N782AL Injuries: 3 Fatal

Accident Summary: Aircraft was destroyed by ground impact and fire during attempted takeoff.

Probable Cause: Probable cause was determined to be loss of directional control by pilot in command during the takeoff roll, flightcrews lack of understanding of the three-engine takeoff procedures and their decision to modify these procedures and the failure of the company to ensure that the flight crew had adequate experience, training and rest to conduct the non-routine flight

Flight Crew/Fatigue Related Information: Safety board believes the captain and other crew members were experiencing fatigue at the time of the accident. The captain's performance in the accident reveals many areas of degradation in which fatigue is probably a factor. Accident report notes a demanding Delaware -Germany overnight round trip flight (6 time zones crossed) and a daytime rest period which caused disruptions in circadian rhythms. Additionally, the captains last rest period was repeatedly interrupted by the company. Report also notes that since flight was non-revenue flight, it was under different duty rules and the same flight, were it a revenue flight, would have been illegal given the rest periods the crew had.

SCORE: 0.9 Fatigue was a significant problem in this accident. With or without crew's inadequate training & knowledge of 3-engine T/O, NPRM would preclude this crew from this ferry trip. Also, all 3 crew performed poorly & all 3 likely were fatigued, per NTSB, & all 3 exhibited “performance degradation” symptomatic of fatigue (difficulties in setting proper priorities & continuation of T/O attempt despite disagreement & confusion on important issues).

3. Date: 12/20/1995

NTSB Identification: DCA96RA020, American Airlines

December 20, 1995 in Cali, Colombia

A/C: B757-200, N651AA Injuries: 160 Fatal, 4 Serious

Accident Summary: Aircraft crashed 38 miles north of Cali, Columbia into mountainous terrain during a descent under instrument flight rules

Probable Cause: Probable causes were determined to be the flight crew’s failure to adequately plan and execute the approach to runway 19 at SKCL and their inadequate use of automation; Failure of the flightcrew to discontinue the approach into Cali, despite numerous cues alerting them of the inadvisability of continuing the approach; The lack of situational awareness of the flightcrew regarding vertical navigation, proximity to terrain, and the relative location of critical radio aids; Failure of the flightcrew to revert to basic radio navigation at the time when the FMS-assisted navigation became confusing and demanded an excessive workload in a critical phase of the flight.

Flight Crew/Fatigue Related Information:

At 2138 CFIT at 9000; peak at 9190. Night VOR/DME approach from MIA; 2 hrs late. PIC concerned to get cabin crew on ground to meet AAL rules on cabin crew rest (for next day return flight). Cali in long N/S valley; high terrain west & east. Cleared to Cali VOR; readback "cleared direct," entered "direct;" way points go off display. Later cleared to interim Tulua VOR. Expecting “direct,” crew became unsure of location. CVR shows crew fumbled with charts & Tulua ID, but already past Tulua. When crew finally entered Tulua, A/C began turning back to Tulua; PIC overrode. Then ATC offered direct approach from north (was 01; now 19). Crew rushed to get down. Put in single-letter ID for ROSO, but Colombia has 2 navaids with single-letter "R." Per ICAO, software defaults to "R" with more traffic (well north at Romeo VOR--Bogota); had to punch in all 4 letters for ROSO. Again A/C began turning back. Crew now very confused & they knew it. FO (PF): "where are we?" PIC says go S/SE – now east of valley, 13 miles off course & below terrain between A/C & Cali. Now more confused; reading DME to ROMEO, thinking it was ROSO. Stepped down early, configured to land as GPWS sounded. Pulled up but did not retract spoilers; slow climb (184 knots at impact). Hit east slope nose up, skidded over top & down west side. Both pilots, 6 FA & 152 pax fatal; 4 pax serious.

CAUSE per Colombian CAA: 1. crew's failure to adequately plan & execute approach to runway 19 & inadequate use of automation; 2. Failure to discontinue approach, despite numerous cues; 3. lack of situational awareness regarding vertical navigation, proximity to terrain, & relative location of critical radio aids; 4. Failure to revert to basic radio nav when FMS-nav became confusing & demanded excessive workload. Factors: 1. crew's ongoing efforts to expedite approach & landing to avoid potential delays from exceeding company duty time limits; 2. execution of GPWS escape maneuver with speed brakes deployed; 3. FMS logic that dropped all intermediate fixes from display(s) upon execution of direct routing; 4. FMS-generated nav information that used different naming convention from that published in nav charts."

SCORE: 0.35 Crew certainly would have been tired, despite being first of their duty tour. PIC had been awake close to 17 hours & FO had been awake at least 15 hours (14 & 17 hours are key thresholds in fatigue). Yet even if each had been operating earlier in their day, they likely would not have sorted out confusion created by single-letter identifier for Rozo & Romeo. Yet more rested crew may have avoided readback-hearback error related to “direct” with interim way points. Crew clearly knew they were very confused & that they were uncertain of their position in rugged terrain. More alert crew might have responded more appropriately, either by climbing above terrain to sort things out, or by reverting to radio nav until they re-established their position, or may have recognized that over-ride of northbound turn had pushed them across ridge line, east of valley. Though crew certainly would be tired, fatigue was less than a show-stopper. Key factors would have remained with or without alert crew: non-radar environment; confusion from multiple identifiers; self-induced pressure; unexpected change to unfamiliar step-down approach at night in mountainous terrain; & significantly delayed flight. The requirements might have led to avoiding confusion or to more appropriate response to confusion.

4. NTSB Identification: NYC96FA174, TWA

August 25, 1996 in JFK, NY

A/C: L-1011, N31031 Injuries: None

Date: 8/25/1996

Accident Summary: Aircraft was substantially damaged when the tail struck the runway, while landing at John F. Kennedy International Airport, Jamaica, New York (JFK).

On arrival in JFK area, wx was ¼-mile in fog, scattered at 200, & temp/dew of 66/66F. Crew expected 4R, but before reaching FAF, 4R went below minimum & ATC offered 4L (still above minimum). PIC accepted & FO (PF) transitioned to 4L. Inspection methods from Lockheed & adopted by TWA did not adequately specify how to check slat drive system for slack.

But crew failed to reset altimeter bug for new runway (100 feet higher than 4R). PIC also missed several required call-outs on approach & no charts for 4L were on board. When PF asked for charts, PIC said "just fly the approach." A/C was slow & unstable throughout approach & when altimeter read 50 feet (in fact 150 feet), A/C began to flare. FO recognized they were high & pushed nose over. On landing, A/C had tail strike & substantial damage. Failure to reset altimeter & absence of charts were fundamental in this accident.

Probable Cause: Probable cause was determined to be the failure of the flight crew to complete the published checklist and to adequately cross-check the actions of each other, which resulted in their failure to detect that the leading edge slats had not extended and led to the aircraft's tail contacting the runway during the computer-driven, auto-land flare for landing.

Flight Crew/Fatigue Related Information: The captain reported that he had difficulty adjusting to disruptions in his sleeping schedule, and for this reason did not bid to fly international routes. According to his sleep schedule, he had been awake about 24 hours at the time of the accident and reported that he that he felt, ""awful, just tired and exhausted."" The first officer said that the captain attempted to rest during the cruise portion of the flight to JFK, with his head back in the seat, but that there were visiting crewmembers in the cockpit and the captain might not have received good rest. In addition, the captain commented that he had not slept well in the hotel.

The first officer reported that he had flown the LAS layover trip several times during July, and had learned the importance of good sleep for flying it. He reported that he had in excess of 14

hours of rest in the scheduled 24 hours of off duty, which was split over two periods. At the time of the accident he had been awake for over 9 hours following a rest in excess of 5 1/2 hours.
The flight engineer reported that she had not slept well in the hotel on the layover. Additionally, she reported that she felt rested when the accident trip began; however, at the time of the landing she was getting tired

SCORE: 0.35 Had crew been better rested, they may not have missed altimeter reset, may have recognized or acted upon unstable approach, or may have gone around, as required by company procedures when not stable at 500 feet. NPRM's treatment of night operations may have affected this flight. Conversely, crews have made similar errors when well rested & flying at mid-day. FAA believes that avoidable fatigue contributed to crew’s failures on approach.

5. NTSB Identification: NYC99LA052, Colgan Air

January 22, 1999 in Hyannis, MA

A/C: BE-1900, N215CJ Injuries: None

At 1719 (dusk), Beech 1900D by Colgan substantially damaged on landing at HYA. No injury to PIC, FO & 2 employees as pax on positioning flight from BOS to HYA in IMC. Started taxi at BOS at 1600. T/O & en route uneventful. But RVR at HYA went below minimum while en route. Wx was 100-foot ceiling in fog, with variable winds at 3 knots.
On arrival at HYA, PIC performed 2 missed approaches. Before trying 3rd approach, he advised tower & pax that this was last shot, or they return to BOS. On third approach, both PIC & FO visually acquired runway. FO said PIC lined up with centerline & requested flaps. FO said A/C “floated at 20 feet over runway at normal transition when I heard PIC taking power levers over

flight idle gate by sound of engine/props.' This placed prop in 'BETA' range. A/C then started to sink, & PIC pulled back on control yoke.

Main gear struck ground & fractured during +2.9G touchdown, which occurred 2500 feet beyond approach end of 5,252 foot runway. Ran off right side of runway, 4700 feet beyond approach end & stopped. To place throttles in BETA, it was necessary to lift power levers over flight idle stop. Flight manual included warning: 'Do not lift power levers in flight.'

On accident day, PIC reported for duty at 0535, with first departure from HYA at 0620. He returned to HYA at 0920, after 3 flights & 2:31 flight time. Then with different FO, PIC T/O for Boston at 1100. They flew 5 more flights for 3:53 flight hours, then returned to BOS at 1540.

Probable CAUSE: PIC's improper placement of power levers in BETA position while in flight. Factors: fog & dusk conditions.

SCORE: 0.15 Accident report summarizes only Captain's flight day, not his preceding 72 hours. Clearly had a long day & difficulty getting into HYA did not help. Started taxi at BOS 12.5 hours into duty day for flight to HYA, so he needed to be on ground at HYA within half-hour to beat new NPRM max duty day. May have precuded this PIC from this flight (or not – close call). Also, though better rested PIC may have handled flare better, others have pulled throttle & props into beta. Fatigue might help explain PIC's decision to take 3 shots at landing below mimium,

6. NTSB Identification: NYC99FA110, American Eagle

May 8, 1999 in JFK, NY

A/C: SF34, N232AE Injuries: 1 Serious

Accident NYC99FA110

Accident Summary: Aircraft sustained substantial damage during landing at John F. Kennedy International Airport (JFK)

Probable Cause: Probable cause was determined to be the pilot-in-command's failure to perform a missed approach as required by his company procedures. Factors were the pilot-in-command's improper in-flight decisions, the pilot-in-command's failure to comply with FAA regulations and company procedures, inadequate crew coordination, and fatigue

Flight Crew/Fatigue Related Information: On May 6, 1999, the captain went off duty about 2030, drove home, and was asleep about 2300. On May 7, 1999, he awoke about 0700. He attempted to nap about 1200, but was unsuccessful. He reported for duty about 2200. The first officer was off duty on May 6, 1999. He departed Las Vegas, Nevada (commuting on a jumpseat) at 1230, and arrived at JFK about 1730. He ate, then rested in the pilot's crew room, but did not sleep. There was a 3 hour time difference between Las Vegas and JFK. The trip sequence scheduled the pilots to depart JFK at 2246, arrive at BWI at 2359, on May 7, 1999; and depart BWI for JFK at 0610 on May 8, 1999. They were provided with individual rooms at a local hotel, approximately 10 minutes from the airport. Due to a takeoff delay at JFK, the flightcrew did not arrive at BWI until 0025. They arrived at the hotel about 0100. The captain stated that he was asleep by 0130. He awoke at 0445 for the scheduled 0530 van ide back to the airport. The first officer stated that he was asleep between 0130 and 0200. He received a wake-up call at 0445. During post-accident interviews, both pilots stated that they were fatigued.

At 0702, SF34 by American Eagle substantially damaged on landing at JFK; 1 pax serious; no injury to 26 pax, FA & 2 pilots. En route from BWI uneventful. On arrival in NY area, crew completed checklists & briefings for runway 04 when ATC advised crew that RVR for 04 was 1,600. Crew needed 1800 so ATC cleared them to holding fix at 4,000. While flying toward holding fix, RVR increased. ATC offered crew ILS approach, but advised that they might be too high. PIC accepted clearance nevertheless. Controller asked if crew could make approach from their position. PIC said yes & continued entire approach with excessive altitude, airspeed, & rate of descent, while remaining above glide slope. This violated company procedures & FAR 91.175. Crew then failed to respond to 4 audible GPWS warnings. During approach, FO failed to make required callouts, including missed approach callout. Landed 7,000 feet beyond approach end, at 157 knots, & overran.

During interviews, both pilots said they were fatigued. Crew was working continuous duty overnight schedule. Continuous duty overnights (CDO) at American Eagle identifies trip sequence that is flown during late night hours, extending into early morning hours, with significant elapsed time period between one arrival & next departure. Since break between flights is not sufficient to qualify as free from duty rest period, crew remains continuously on duty, though carrier may have provide hotel room for rest.

On May 6, PIC went off duty at 2030, drove home, & was asleep at 2300. On May 7, he awoke at 0700. He tried to nap about noon but was unsuccessful. He reported for duty at 2200. FO was off duty on May 6. He departed LAS (commuting on jumpseat) at 0930 local time on May 7 (1230 EDT) & arrived at JFK at 1730. He ate then rested in crew room, but did not sleep. Trip sequence scheduled crew to depart JFK at 2246, arrive BWI at 2359, & then depart BWI for JFK at 0610 on 5/8. They were provided with individual rooms at hotel 10 minutes from airport. But, due to delays at JFK, crew did not arrive at BWI until 0025. They arrived at hotel at 0100 & PIC was asleep by 0130. He awoke at 0445 for scheduled 0530 van ride back to airport. FO said he was asleep between 0130 and 0200. He received wake-up call at 0445.

CAUSE: PIC's failure to perform missed approach as required by company procedures. Factors:

PIC's improper in-flight decisions, failure to comply with FARs & company procedures, inadequate crew coordination, & fatigue.

SCORE: 0.5 Crew likely was tired, & helps to explain why crew did little right on or before the approach. Yet, the requirements would not reach the practice of “Continuous Duty Overnight, but it would have reached the FO’s continuous day starting with his commute. This would not have helped PI, but it might have ensured at least one alert crewmember.

7. NTSB Identification: DCA99MA060, American

June 1, 1999 in Little Rock, AR

A/C: MD-82, N215AA   Injuries: 11 Fatal, 45 Serious

Accident DCA99MA060

Accident Summary: Aircraft crashed after it overran the end of runway

Flight Crew/Fatigue Related Information: The captain went to sleep about 2200 the night before the accident and slept until between 0700 and 0730. On nonflying days, he would typically go to sleep between 2130 and 2200, wake up about 0515, and leave for work about 0600. On May 30, 1999, the first officer traveled from his home outside Los Angeles, California, to Chicago. The first officer indicated that he had been commuting from his home to the Chicago-O’Hare base for about 3 months and that, as a result, he was adjusted to the central time zone. The first officer indicated that he was involved in routine activities while in the Chicago area. He went to bed between 2000 and 2200 the night before the accident and woke up about 0730.

The board found that at the time of the accident (2350:44), the captain and the first officer had been continuously awake for at least 16 hours. Also the accident time was nearly 2 hours after the time that both pilots went to bed the night before the accident and the captain’s routine bedtime (between 2130 and 2200), meaning their circadian systems were not actively promoting alertness. The Safety Board concludes that the flight crew's degraded performance was consistent with known effects of fatigue.

CAUSE: failure to discontinue approach when severe thunderstorms & associated hazards to flight operations had moved into airport area, & crew's failure to ensure that spoilers had extended after touchdown. Factors: flight crew's (1) impaired performance resulting from fatigue & situational stress associated with intent to land under the circumstances, (2) continuation of approach when company's max crosswind component was exceeded, & (3) use of reverse thrust greater than 1.3 engine pressure ratio after landing.

SCORE: 0.15 FO was 5 months into 1-year probation & paired with Chief Pilot from ORD base. But FO later testified of good working relationship with PIC & said rank of Chief Pilot was no barrier. Accident occurred 14 hours into duty day & nearly 17 hours after awakening. Long day & disrupted flight into & from DFW. FO showed signs on CVR of recognizing that landing was not a good idea, but PIC focused on landing. Was this fatigue or task fixation? Would more rest have made recently hired FO more willing to speak up to PIC-Chief Pilot? Call-outs were made & SOPs indicate crew was engaged. Perhaps a less worn-out PIC would have considered diverting (or not), or may at least have responded to implied warnings from tower. Would have exceeded the requirements contained in this final rule by 12 minutes at impact; may have changed sequence before T/O (had to be released by 2316 - - 2304 might have made a difference).

8. NTSB Identification: DCA05MA004, Corporate Airlines as American Connection

October 19, 2004 in Kirksville, MO

A/C: BAE-32, N875JX Injuries: 13 fatal, 2 Serious

Accident AAR0601

Accident Summary: Aircraft struck trees on final approach and crashed short of runway.

At 1937 on LOC/DME final at Kirksville in IMC, hit trees at 33 feet QFE on center line 1.3 NM out. WX: wind 020 at 6, visibility 4, mist & 300 overcast. On final, PIC (PF) maintained constant descent of 1200 FPM until impact (met company SOP but exceeded that recommended by FAA for descent below 1000 AGL). At MDA, PIC said 'I can see ground there' (as PF, he should have been on instruments). Continued through MDA & asked FO 'what do you think?' FO: 'I can't see (expletive).' Seconds later PIC said 'yeah, there it is. Approach lights in sight' just as GPWS called “200” & FO announced 'in sight, continue'. (Both looking out window; nobody on instruments). Never recognized low altitude until seeing trees 2 seconds before impact. Wx complicated approach but crew never seemed too concerned about wx. Flew approach in casual fashion & lack of professionalism: no sterile cockpit (casual conversation); non-standard phraseology; humming; etc. PIC known for sense of humor & was said to 'emphasize fun in the cockpit'.

Crew was fatigued: reported for duty at 0514. Accident was near end of 6th sector on 'demanding' day in IMC. Crew had been on duty 14.5 hours & PIC is said to have slept poorly night before. PIC commuted from home in NJ to STL & FO commuted from Ohio. Reported for duty at 1345 on 10/17 (2 days before accident). Flew 3 flights in 8-hour duty day & arrived at over-night destination (Quincy) at 2125. On 10/18, departed Quincy at 1415 after more than 15 hours off. Flew 3 flights & 6:20 duty day. Arrived at over-night destination in Burlington at 1945. On 10/19, duty day began at 0514 after 9 hours off. Departed BRL at 0544 to STL &

arrived 0644. Next 2 flights cancelled due to wx. T/O for round-trip from STL-Kirksville (IRK) at 1236. Landed STL at 1745.

Probable Cause: failure to follow procedures & improper non-precision instrument approach at night in IMC, including descent below MDA before acquiring runway environment. Factors: non-standard callouts; unprofessional demeanor; & crew fatigue.

Probable cause was determined to be the pilots' failure to follow established procedures and properly conduct a non-precision instrument approach at night in IMC, including their descent below the minimum descent altitude (MDA) before required visual cues were available (which continued un moderated until the airplane struck the trees) and their failure to adhere to the established division of duties between the flying and nonflying (monitoring) pilot

Flight Crew/Fatigue Related Information: Captain reportedly did not sleep well the night before the accident but did not report feeling tired. He was later observed resting on a couch the morning of the accident. First officer reportedly did not have any trouble sleeping the night before the accident and the day of the accident seemed alert and happy.

However, the flight crews rest time (2100-0400) did not correspond favorably with either ones sleeping patterns and at the time of the accident, they had been on duty 14.5 hrs and it had been 15 hrs since their last rest period. The board suggests that the pilot deficiencies observed could be consistent with fatigue impairment

SCORE: 0.9 Accident flight T/O STL at 1842 for IRK on 6th flight of day after 6:14 flight time & 14.5-hour day already. Long, brutal day in IMC that started with limited rest period. Crew was familiar with each other & with IRK. WX & PIC's established practice of "fun in the cockpit" also were factors. Fatigue had to be a big player, though PIC's history of "fun in cockpit implies other issues. The requirements in this final rule would have precluded this crew from taking this flight.

9. NTSB Identification: DCA06MA064, Comair as

August 27, 2006, Lexington, KY

A/C: CRJ-200, N431CA Injuries: 49 Fatal, 1 Serious

Accident AAR0705

Date: 8/27/2007

Accident Summary: Aircraft crashed during takeoff from Blue Grass Airport, Lexington, Kentucky.

At 0607 Comair 5191 crashed on T/O from Blue Grass Airport (LEX) for ATL. A/C ran off end of Runway 26 & was destroyed by impact forces & post crash fire. T/O wrong runway; had been cleared to T/O on Runway 22. PIC, FA & all 47 pax fatal; FO serious. Threshold for 22 & 26 are close & common taxiway had construction near thresholds, possibly inviting confusion in darkness after short taxi from nearby terminal. Also, sole controller in tower turned away after clearing A/C for T/O (A/C was the only active A/C on the airport).

Runway 22 had minor construction work underway preceding week with NOTAM for “some” lights out. Crew also appeared behind the curve early: approached wrong RJ on ramp (corrected by ramp staff); called Toledo tower rather than LEX (corrected by tower); called wrong flight number (corrected by tower); & vocally ran through checklist on taxi so quickly NTSB had to slow CVR read-out to understand it. Crew then taxied onto darkened, closed short runway (26). Initiated rolling T/O, further reducing chance to recognize wrong runway, crossed intersection with active runway, lighted 7,000-foot Runway 22, 500 feet from start of rolling T/O on 26, continued & rotated just as they ran out of pavement. Ran onto grass & nose lifted slightly (with main gear tracks deepening in grass) just as A/C struck perimeter fence, then rolled at high speed into trees & burned out. PIC, FA & 47 pax fatal; FO serious. CAUSE: crew's failure to use available cues & aids to identify A/C's location on airport surface during taxi & their failure to cross-check & verify that A/C was on correct runway before T/O. Factors: crew's non-pertinent conversation during taxi, which resulted in loss of positional awareness, & FAA's failure to require that all runway crossings be authorized only by specific ATC clearances.

Probable Cause: Probable cause was determined to be s the flight crewmembers' failure to use available cues and aids to identify the airplane's location on the airport surface during taxi and their failure to cross-check and verify that the airplane was on the correct runway before takeoff

Flight Crew/Fatigue Related Information: The captain and the first officer received more than the minimum required rest periods during their respective trips in the days before the accident, and their flight and duty times in the week and month before the accident would not have precluded them from obtaining adequate sleep. Also, both pilots had only been awake for about 2 hours at the time of the accident. Two factors in the pilots' schedules just before the accident could have been associated with the potential development of a fatigued state: acute sleep loss and circadian disruption - The captain and the first officer also awakened on the day of the accident at a time when they would normally be asleep.

Overall, The Safety Board concludes that, even though the flight crewmembers made some errors during their preflight activities and the taxi to the runway, there was insufficient evidence to determine whether fatigue affected their performance

SCORE: 0.35 Fatigue likely was not an issue for PIC (PNF) but it may have affected FO's performance (PF). FO began his duty tour on 8/25 at JFK. He drove that morning to FLL near his home for flight to JFK. Departed FLL at 0559 & arrived JFK at 0832. NTB does not note when FO awoke, but it likely would have been around 0400 to reach his 0559 departure at FLL. His duty day then began with flight from JFK to ROC at 1305. Return flight to JFK T/O at 1600 but crew had to divert to BDL for fuel & did not land at JFK until nearly 2000. Due to late arrival, crew was asked to reposition A/C to LEX. Departed gate at 2130 but were not able to T/O until 2300; arrived at LEX at 0140. FO reached his hotel at 0210 on 8/26. By the time he got to bed, FO would have had nearly a 23-hour day. On 8/26, FO had day off. He told his wife that morning by phone that he had "slept in" & planned to go to bed early that night. Phone records, hotel key cards, & credit card records indicate normal day of activity through at least 1830 on his rest day, when FO paid for meal in hotel restaurant (probably asleep no earlier than 2000). On 8/27 he & PIC reported for duty at 0515. FO likely had same wake-up call as PIC (0415).

Though FO had free day before accident, 8/25 was 23-hour day, with very late time to bed, followed on 8/27 by very early start to his day. Despite "sleeping in" on 8/26, FO would have been coping with sleep deficit. This could partly explain his confusion or inattention prior to departing gate. It also could have made him more vulnerable to visual confusion caused by minor construction & related barriers, & his failure to respond to visual cues of unlighted runway & crossing active runway that was fully lighted. Yet other factors also may explain these failures. For example, FO had flown into LEX 2 nights before when "lights were out all over the place." That was at end of his 23-hour day; neither he nor that Captain apparently recognized that outages had been NOTAMed on 8/25. On morning of accident, runway end identifier lights were out of service. Closeness of 2 runway ends with single taxiway also increases risk of wrong runway T/Os. Finally, with terminal close to runway ends, taxi time was short, increasing percentage of head-down time, at least for PNF. The requirements would have precluded FO from taking positioning flight & extending very long duty day on first day. This may have averted the entire scenario.

10. NTSB Identification: DCA07MA072, Shuttle America

February 18, 2007, Cleveland, OH

A/C: ERJ-170, N862RW Injuries: None

Accident AAR0801

Accident Summary: Aircraft overran the end of the runway during a landing in snowy conditions and stuck an ILS antenna and fence, and the nose gear collapsed.

Flight Crew/Fatigue Related Information: The day of the accident, the captain had been awake for all but about 1 hour of the previous 32 hours; he stated that his lack of sleep affected his ability to concentrate and process information to make decisions and, as a result, was not “at the best of [his] game.” The captain also reported that he had insomnia, which began 9 months to 1 year before the accident and lasted for several days at a time. From Feb 11-14 the first officer flew a total of 18hrs 27 mins. On Feb, he started a 3-day 6-leg trip and by the 18th, his total flight time was 11 hrs 50 mins. At the time of the accident, the first officer had been on duty about 9 hrs 15 mins with a total flight time of 5 hrs 30 mins. The first officer agreed to be the flying pilot because of the captain’s references to fatigue and lack of sleep the night before.

A contributing factor to the accident was the pilot’s fatigue which affected his ability to effectively plan and monitor the approach and landing. The Safety Board concludes that the captain was fatigued, which degraded his performance during the accident flight.

CAUSE: failure to execute a missed approach when visual cues for runway were not distinct & identifiable. Factors: (1) crew's decision to descend to ILS DH instead of localizer (glideslope out) MDA; (2) FO's long landing on short, contaminated runway & crew's failure to use reverse thrust & braking to max effectiveness; (3) PIC's fatigue, which affected his ability to effectively plan for & monitor approach; & (4) carrier's failure to administer attendance policy that permitted crew to call in as fatigued without fear of reprisals.

SCORE: 0.5 A better rested PIC likely would have flown this leg, & likely would have increased chances of going around. However, it but probably would not have changed confusion over glideslope & ILS DH versus localizer MDA. Either way, the requirements would have enabled PIC to opt out of flight.

11. NTSB Identification: DCA07FA037, Pinnacle as Northwest Express

April 12, 2007, Traverse City, MI

A/C: CRJ-200, N8905F Injuries: None

Accident AAR-0802

Date: 4/12/2007

Accident Summary: Aircraft ran off the departure end of the runway during snowy conditions.

Probable Cause: Probably cause was determined to be the pilots' decision to land at TVC without performing a landing distance assessment, which was required by company policy because of runway contamination initially reported by TVC ground operations personnel and continuing reports of deteriorating weather and runway conditions during the approach. This poor decision making likely reflected the effects of fatigue produced by a long, demanding duty day, and, for the captain, the duties associated with check airman functions

Flight Crew/Fatigue Related Information: The accident occurred well after midnight at the end of a demanding day during which the pilots had flown 8.35 hours, made five landings, been on duty more than 14 hours, and been awake more than 16 hours. During the accident flight, the CVR recorded numerous yawns and comments that indicate that the pilots were fatigued. Additionally, the captain made references to being tired at 2332:12, 2341:53, and 0018:43, and the first officer stated, "jeez, I'm tired" at 0020:41. Additionally, the pilots' high workload (flying in inclement weather conditions, and in the captain's case, providing operating experience for the first officer) during their long day likely increased their fatigue.

SCORE: 0.9 Crew was clearly tired & had been on duty 15 hours as of accident time & 12:44 hours at pushback; The requirements would have precluded this crew from taking this flight.

12. NTSB Identification: DEN07LA101, Great Lakes Airlines

June 20, 2007, Laramie, WY

A/C: BE-1900D, N253GL Injuries: None

Accident DEN07LA101

Date: 6/20/2007

Accident Summary: The airplane landed long, bounced, and touched down again. The captain tried to slow down and turn the airplane off the runway on to a taxiway at high speed. During the turn attempt, the airplane departed the runway and the airplane's right propeller struck the top of an electrical box that powered the runway approach lighting system.

Probable Cause: Probable cause was determined to be The pilot's improper decision, his misjudgment of his speed and distance, and his failure to perform a go-around resulting in the airplane overrunning the runway and striking an electrical box. Factors contributing to the accident were the failure of the crew to perform proper crew resource management, the first officer's failure to intervene before the accident occurred, and the electrical box.

Flight Crew/Fatigue Related Information: Only mention of flight crew schedule is the crew was on the third day of a three-day trip, which had started in Cortez, Colorado, that morning at 0520. The crew had flown from Cortez to Denver, Colorado, to Farmington, New, Mexico, back to Denver, then to Laramie, and then to Worland.

SCORE: 0.15 Given number of days & segments flown, the accident occurred precisely at NPRM's proposed limit of 11-hour duty day. The requirements might have made a difference.

13. NTSB Identification: DCA09MA027, Colgan Air as Continental Connection

February 12, 2009, Clarence Center, NY

A/C: DHC-8-400Q, N200WQ Injuries: 50 Fatal

Accident DCA09MA027

Accident Summary: Aircraft crashed into residence 5 nautical miles northeast of the airport and was destroyed by impact and post-crash fires.

At 2217 Dash 8-Q400 by Colgan Air as Continental Connection crashed on ILS approach to runway 23 at BUF 5 NM NE of airport in Clarence Center. FO arrived EWR on red-eye from West Coast via MEM at 0623. First flight @ 1300 cancelled. Accident flight delayed; T/O EWR at 2120. Newly upgraded PIC (110 hours in M/M); FO (PF) had 700 hours in type. Steady, non-pertinent chatter enroute & throughout approach. FO notes little knowledge of icing. Other pilots describe light-moderate rime icing b/ 6,500 & 3,500 but none at 2,300. Accident A/C was in icing 9 minutes. De-icing system was "on" (which increases speed at which crews get low-speed cue, but does not affect actual stall speed).

At 22:15:14 BUF Approach cleared flight for ILS approach to runway 23 (acknowledged). At 22:16:02, engine power levers were reduced to flight idle & Approach instructed crew to contact Tower. Crew extended gear & auto flight system captured ILS 23 localizer. PIC then moved engine conditions levers forward to max RPM position as FO acknowledged instructions to Tower. At 22:16:28 FO moved flaps to 10°, & 2 seconds later stick shaker activated (warning of impending stall) & autopilot disconnected, with ”disconnect” horn sounding until impact. Stickpusher then activated (to correct actual stall). Crew added power to 75% torque. At 2216:37, FO told PIC that she had put flaps up; airspeed now 100 knots, & roll angle reached 105 degrees right wing down before A/C began to roll back to left & stick pusher activated second time (about 2216:40). Roll angle then reached 35 degrees left wing down before A/C began to roll again to right. FO then asked whether she should put gear up; PIC responded “gear up” with expletive. Pitch & roll had reached 25 degrees nose down & 100 degrees right wing down, when A/C entered steep descent. Stick pusher activated third time (at 2216:50), followed by impact. All 4 crew & 45 pax fatal; 1 ground fatal. (Not an icing accident.)

Both pilots likely were significantly fatigued. Both pilots were based at EWR. PIC lived near Tampa & FO lived near Seattle. Neither had “crash pad” at EWR & both regularly used crew room to sleep. PIC tried to bid trips that ensured some nights in hotels at out-stations. At EWR he usually slept in crew room. FO always slept in crew room at EWR & was open about it.

PIC, recently upgraded, commuted to EWR on 2/9 from TPA; arrived EWR at 2005 & spent night in crew room. Phone records & log-ins to crew tracking system indicate he got little sleep. Reported for duty at 0530 on 2/10, flew 3 flights & arrived at BUF at 1300& had hotel room. Left hotel at 0515 on 2/11 to report at 0615. Again flew 3 flights & returned to EWR at 1544; spent rest of day & night in crew room. Again, phone, tracking system & contact with others indicate very little sleep.

FO commuted to EWR from SEA. She awoke on 2/11/ at 0900, arrived at PDX at 1730 for FedEx flight to MEM; arrived MEM at 0230 EST (2230 PST); had about 90 minutes of sleep on flight. She then T/O MEM at 0418 & arrived EWR at 0623, sleeping for "much of" 2-hour flight. At EWR, she spent day in crew room & napped, but phone, tracking system & conversations show she got little sleep.

On 2/12, crew was scheduled for 3 flights: EWR-ROC; ROC-EWR; & EWR-BUF. First 2 cancelled due to winds at EWR & ground delays. Dispatch estimated 1910 departure for accident flight. Multiple delays; pushed back at 1945 & finally T/O 2120 for BUF. FO noted multiple times that she was not feeling well & before T/O said she was "ready to be at hotel" at BUF.

CAUSE: Captain's inappropriate response to activation of stick shaker, which led to stall from which A/C did not recover. Factors: (1) crew's failure to monitor airspeed in relation to rising position of low-speed cue, (2) crew's failure to adhere to sterile cockpit procedures, (3) PIC's failure to effectively manage flight, & (4) Colgan's inadequate procedures for airspeed selection & management during approaches in icing conditions. NOTE: NTSB Cited fatigue in findings, but not in causal statement because NTSB said it could not determine "the extent of their impairment & degree to which it contributed to performance deficiencies." But clearly suggests it did contribute. NOTE: NTSB was divided on the issue, with some arguing that the overwhelming issue was skills-based: pulling up to 30 degrees, not pushing power up all the way even well into the stall, and thereby missing several opportunities to allow the aircraft to fly out of the stall. In short, debate is this: though the crew clearly was fatigued, would the outcome have been any different if the same crew were better rested?

Flight Crew/Fatigue Related Information: On the day of the accident, the captain was scheduled to report to EWR at 1330. Because his duty period on February 11, 2009, had ended about 1544, he had a 21-hour, 16-minute scheduled rest period before his report time. However, at 0310 on February 12, the captain logged into Colgan's CrewTrac computer system. This activity would have meant that he had, at a minimum, a 5-hour opportunity for sleep followed by another sleep opportunity of about 4 hours. During the 24 hours that preceded the accident, the first officer was reported to have slept 3.5 hours on flights and 5.5 hours in the crew room.

At the time of the accident, the captain would have been awake for at least 15 hours if he had awakened about 0700 and for a longer period if he had awakened earlier. The accident occurred about the same time that the captain's sleep opportunities during the previous days had begun and the time at which he normally went to sleep. The first officer had been awake for about 9 hours at the time of the accident, which was about 3 hours before her normal bedtime. The captain had experienced chronic sleep loss, and both he and the first officer had experienced interrupted and poor-quality sleep during the 24 hours before the accident

The pilots' failure to detect the impending onset of the stick shaker and their improper response to the stick shaker could be consistent with the known effects of fatigue. The NTSB concludes that the pilots' performance was likely impaired because of fatigue, but the extent of their impairment and the degree to which it contributed to the performance deficiencies that occurred during the flight cannot be conclusively determined

SCORE: 0.5 Accident had many issues, but fatigue clearly was one of them. Both pilots had to be exhausted when they initiated approach to BUF. PIC was completing 4th day since awakening on 2/ 9. He had opportunity for quality sleep only on night of 2/10, & that was cut short with departure from hotel at 0515 on 2/11. Both pilots essentially stayed up all night on 2/11, with no opportunities for deep sleep, then found themselves operating late-night flight after day-long cancellations & delays. At one level, any rule that might have diminished this crew's fatigue could have been a show-stopper with a high score. However, crew had other basic problems. PIC clearly was not well versed in stall recognition nor response to stall (never went to full power, which likely would have enabled the aircraft to fly out of the stall in at least 2 points during the sequence). Same lack of recognition & knowledge appears true of FO; she raised flaps during a stall. Being well rested would not have provided this crew with any more skill than they already had, it would not necessarily have averted the chatter sustained throughout flight, nor would it necessarily have led crew to enter proper ref speeds for conditions. BUT more rest may have at least kept them tuned in enough to monitor airspeed. That alone could have averted the entire scenario. However, too many other fundamental issues to score above 50%.