IPA PARTY SUBMISSION

TO

NATIONAL TRANSPORTATION SAFETY BOARD

Accident Identification

Accident Number:	DCA13MA133
Operator:	United Parcel Service Flight 1354
Location:	Birmingham-Shuttlesworth International Airport (KBHM), Birmingham, AL
Date:	August 14, 2013
Airplane:	A300-600F, N155UP

INDEPENDENT PILOTS ASSOCIATION

May 1, 2014

The Independent Pilots Association (IPA), as a party to this investigation, has reviewed and analyzed all the facts pertaining to the UPS Flight 1354 accident. As professional pilots, we acknowledge that pilots can and do make errors. When we review, however, the number and types of errors made by the experienced pilots in this particular crash, this investigation should go beyond cataloging errors to asking why such errors were made in the first place.

The IPA teamed with an independent expert to review the available public data from the accident. Merrill Mitler, Ph.D., is a recognized sleep and fatigue expert who has published over 200 scientific journal articles, several book chapters and over 100 invited publications in textbooks.

Dr. Mitler, working with subject matter experts from the IPA, was able to determine by a process of cause elimination and logical deduction that crew fatigue likely played a decisive and contributing role in explaining why a professional, trained and qualified crew would make the errors and omissions documented in the factual record.

Pilots take into account many external factors in their decision making process. In the accident crew's own words from the CVR, UPS "has no clue" about how their pilot employees perceive the corporation's fatigue mitigation and safety culture at UPS. At the request of the NTSB, the IPA conducted a safety survey of the pilot group and the responses are alarming. The results overwhelmingly indicate that much work needs to be done in order to establish a true safety culture inclusive of all stakeholders, to include the pilot group.

The following flight summary and recommendations are submitted to the NTSB for consideration.

Respectfully submitted,

[redacted]

Captain Stephen Whyte
IPA Party Coordinator

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Summary

United Parcel Service Flight 1354, an Airbus A300-600F, operating from Louisville, KY (KSDF) to Birmingham, AL (KBHM) crashed short of runway 18 while attempting to land during the backside of the clock, early morning hours of August 14, 2013. Both crewmembers were fatally injured, and the aircraft was destroyed.

The Captain, a former military aviator was hired by UPS in 1990. He had been a Captain with UPS for four years with 8,600 total flight hours and over 3,200 hours in the A300. The First Officer had 4,700 total flight hours with over 400 hours in the A300. Both crewmembers were current and qualified with no previous FAA accidents or enforcement actions.

In aviation, subtle errors and oversights can have enormous and, sometimes, fatal consequences. As professional pilots, we acknowledge that pilots can and do make errors. When we review, however, the number and types of mistakes made by the experienced pilots in this particular crash, this investigation should go beyond cataloging errors made to asking why such errors were made in the first place.

As pilots who fly for UPS every day and night, we have closely examined all of the facts. Our experience, as well as science, tells us that fatigue played a decisive role in this crash, and should be closely examined by the Board. The methods developed by NASA and the NTSB for the evaluation of operator fatigue are routinely used by most investigators of transportation and industrial mishaps.[1] These methods include the analysis of work and rest schedules of the operators, the processes of cause elimination and logical deduction. The methods are considered scientifically valid by peer review journals and in civil and criminal litigation.

Human beings are notoriously poor judges of their state of fatigue, and can often overestimate their capabilities. Impairment caused by fatigue is known to be as disabling as impairment caused by alcohol consumption. Furthermore the error patterns in individuals impaired by fatigue are similar to those impaired by alcohol.[2] The increased risks associated with fatigue are also enhanced during backside of the clock operations. These risks are well known and are scientifically documented.[3] In addition, studies have confirmed that daytime sleep is not as restorative as normal nighttime sleep in terms of quality and quantity.

A review of the crew's schedules for the four weeks prior to the accident showed that the Captain, pilot flying (PF), operated 14 duty periods during the backside of the clock, including two separate pairings of six nights in a row. This type of schedule requires a crewmember to sleep during the daytime and be on duty all night. The accident flight was the last leg of the second consecutive all-night duty period for both crewmembers.

[1] See Reference 1a, 1b and 1c
[2] See Reference 1d and 1e
[3] See Reference 1f

During the investigation, NTSB collected information from personal electronic devices (PED). Of note are several references found in the Mobile Devices Factual Report from the F/O's iPhone text messages that identify her state of fatigue.

Two days before the accident duty period, while preparing to report for duty

> 8/12/2013 19:29:38 "Im getting sooo tired"
>
> 8/12/2013 19:35:30 "And its time I get ready"

Later that night while on duty:

> 8/12/2013 21:22:58 "Hey, bak in the ol office, and im sleepy as a :)"

Mid-day the next day (prior to the accident duty period):

> 8/13/2013 11:18:26 "U got that rite, I fell asleep on every damn leg last nite- n rfd now, got here at 6 am n bed by 645 ish, now up, slept like 4 hrs….Van isn't till 8 tonite so hoping I will nap again this afternoon"

In addition, in the Human Performance Group Chairman's Factual Report there are several additional references to both crewmember's state of fatigue. For example, the Captain of the accident flight discussed with another colleague the night before the accident about the flight schedules "killing him" and "he could not keep up flying day/night flops and on one week, off the next. He told another pilot he flew with that the first couple of days of a trip were tough getting back into the schedule and the end of the trip as well."

From the same report, "A friend and colleague of the First Officer stated that he did not think she would call in fatigued; he said they were more the type to 'fly under the radar.' She had told him within the month prior to the accident that she had recently been having trouble staying awake in the cockpit."

From the cockpit voice recorder (CVR) transcript, the Captain and First Officer sitting in the cockpit before the accident flight:

03:42:54.0 First Officer	I was out and I slept today. I slept in Rockford. I slept good.
03:42:59.3 Captain	me too.
03:43:00.1 First Officer	and I was out in that sleep room and when my alarm went off I mean I'm thinkin' I'm so tired...
03:43:06.1 Captain	I know
03:43:06.1 First Officer	…and I slept today
03:43:07.6 Captain	exactly

03:43:08.1	
First Officer	I you know and we just are goin' to Birmingham. What if I was goin' to Burbank?
03:43:10.6	
Captain	and these people---
03:43:11.8	
Captain	really God I know these people have no clue. I know.

Why would two well-trained, professional pilots initiate a flight knowing that they might be suffering the effects of fatigue? As suggested by the accident Captain's comments, UPS has failed to develop a collaborative safety culture that encourages its employees to voice safety concerns including those related to pilot schedules and fatigue. During the course of the NTSB's public hearing, UPS and IPA representatives repeatedly differed on this topic.

In order to learn more, the Board requested the parties to provide survey data concerning crewmember attitudes and perceptions of fatigue-management, safety culture and Safety Management Systems (SMS) at UPS. In response, the IPA conducted a wide-ranging survey of its members. This survey was built around questions assembled by an independent panel of experts and was administered by AmericanPublic.us, a policy, communications and polling firm in Washington, DC. The survey was anonymous, thereby guaranteeing frankness and candor in the responses.

The 37-question survey was conducted during 7-16 March 2014. The response was overwhelming, indicating the high level of interest in the pilot fatigue issue. 2,202 IPA crewmembers submitted survey responses, which is a response rate of 92.6% (margin of error ± 0.57%, confidence interval 95%).

The responses were alarming and below are some of the results (the entire survey is attached to this submission in Reference 3):

- 90% of respondents disagreed (62% strongly, 28% somewhat) that UPS manages fatigue and prevents and mitigates fatigue risks in order to ensure safe fight operations.
- 89% of respondents disagreed (68% strongly, 21% somewhat) that UPS effectively mitigates fatigue when trends or threats associated with scheduled pairings or trips are identified.
- 88% of respondents agreed (58% strongly, 30% somewhat) that calling in fatigued would invite adverse scrutiny from UPS. 80% of respondents agreed (42% strongly, 38% somewhat) that calling in sick would invite adverse scrutiny from UPS.

The survey is a powerful insight into the pilot group's real world experience of the UPS safety culture. While UPS perceives that it recognizes and addresses threats of fatigue in its operation, the pilots who fly for UPS overwhelmingly experience just the opposite. The net result is a corporate culture that fails to proactively address and mitigate known fatigue

threats in UPS' flight operations. This is the cultural environment that exists at UPS and it is against this backdrop that the actions of the accident crew should be evaluated.

The following sequence of errors and omissions is consistent with operator impairment due to fatigue:

- Descending below 10,000 feet the crew recognized that they were high on their desired descent path. They initially attempt to correct this by lowering the gear very early – around 9,000'msl, but never took decisive action to remedy the problem. Instead, they complain about being left up by ATC for the rest of the approach. This error, committed by both trained pilots, is consistent with impairment due to fatigue. It is one more in a sequence of errors of omission and commission and had the effect of compounding the difficulties of the crew's situation.
- The crew was given a heading to join the LOC by ATC. At this point, the PM should have verified the flight plan sequenced correctly. This is the standard procedure for every approach on the A300. However, neither the PF, nor the PM recognized that this step was not accomplished. This error of omission is indicative of operator fatigue and loss of situational awareness.
- After crossing the FAF, the aircraft automation did not initiate a descent as expected by the PF. In response the PF selected Vertical Speed (V/S), which was not briefed, and did not verbalize this action to the PM. By selecting V/S this removed the automated level-off feature of the autopilot. At this point in the flight, it became the sole responsibility of the PF to ensure the aircraft did not descend below the minimum descent altitude. The PF further compounded this increased risk by increasing the V/S to 1,500fpm down – and once below 1,000'agl exceeded the Stabilized Approach Criteria. These errors show a commitment to a flawed course of action. The significance of the cues confronting the pilot are not appreciated and acted upon. This type of error is common in operators impaired by fatigue.
- After making the required 1,000 foot call, the PM failed to make two critical required call-outs: 100 feet above minimums, "Approaching Minimums" and reaching minimum approach altitude, "Minimums." These call-outs are made low to the ground and alert the PF that the aircraft has reached Decision Altitude – either land or Go-Around. The PF also missed recognizing this altitude and did not react correctly. Both crewmembers exhibited a startling loss of situational awareness. These are errors of omission in the crew's commitment to a flawed course of action despite clear cues of danger.
- The crew received two "Sink Rate" warnings and responded as per the procedure in the AOM to adjust pitch, but due to their lack of situational awareness, willingness to accept a lower standard of performance and an error of omission the PF did not adjust the V/S enough in response to the warning.

The crew's state of fatigue manifested itself after top of descent as the flight became more demanding and the time constraints placed on the crew compressed. Flying a non-precision

approach is an infrequent event for flight crews. In fact, testimony during the Public Hearing stated that on average a crewmember might fly a non-precision approach only one or two times a year. The safe execution of a non-precision approach, demands increased vigilance in decision-making, crew coordination and situational awareness. Executing a non-precision instrument approach, even under optimal conditions, is one of the most demanding tasks placed on a flight crew.

For a qualified crew to make so many errors on one flight in our professional opinion is indicative of impairment. A fatigued crew may accept a lower standard of performance, have a delayed response time or fixate on one particular task. In this accident, both the Captain (PF) and the First Officer (PM), exhibited severe degradation in their reaction times and awareness levels.[4] The high rate of descent on approach and lack of situational awareness from the PF, as well as the missed required calls and lack of cross checking from the PM are indications that both crewmembers were fatigued.[5]

If the crew had not been impaired, it is probable that they would have recognized at least one of the many errors made on this flight. They could have responded and corrected the mistake, either with sound judgment or with maneuvering the aircraft away from the ground and re-assessing the situation. Either case would have prevented this accident from taking place.

There have been several NTSB accident reports where fatigue was cited to be an issue.[6] In addition, in the four accidents reports listed below, the NTSB Board found crew fatigue to be a contributing factor:

American International Airways Flight 808, Guantanamo Bay, Cuba, August 18, 1993[7]

Corporate Airlines Flight 5966, Kirksville, Missouri, October 19, 2004[8]

Delta Connection Flight 6448, Cleveland, Ohio, February 18, 2007[9]

Pinnacle Airlines Flight 4712, Traverse City, Michigan, April 12, 2007[10]

We believe that the impact fatigue played in UPS Flight 1354 is similar to the facts found by the NTSB Board in the above accident investigation reports. We urge the NTSB to find fatigue was a contributing factor in this accident.

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[4] See Reference 2
[5] See Reference 1g
[6] See Reference 4a-d
[7] See Reference 5
[8] See Reference 6
[9] See Reference 7
[10] See Reference 8

Recommendation 1

The NTSB should recommend that the Federal Aviation Administration amend its current *Flight Crew Member Duty and Rest Requirements*, 14 C.F.R. Part 117, to include cargo operations. Additionally, until such time as coverage of cargo operators under Part 117 becomes mandatory, the NTSB should recommend that UPS voluntarily opt-in to coverage under FAR Part 117 as allowed by the rule and as recommended by the former DOT Secretary in 2012.

Supporting Information

As required by law, the FAA in December of 2011 issued new regulations to address the problem of pilot fatigue. Flight Crew Member Duty and Rest Requirements, 14 C.F.R. Part 117. (See Final Rule, 77 Fed. Reg. 330.) The new rules were the result of a Congressional mandate and were in keeping with prior NTSB findings. "As the National Transportation Safety Board repeatedly notes, the FAA's [current—Part 121] regulations do not account for the impact of circadian rhythms on alertness" Final Rule p. 334.

In the Final Rule, the FAA acknowledged: "The FAA believes that its current regulations do not adequately address the risk of fatigue," Final Rule p. 334. FAR Part 117 was originally intended to provide a uniform set of flight crew member duty and rest rules that apply to all kinds of flight operations based on the best available scientific information about fatigue.

Despite that purpose, however, the FAA has excluded all-cargo operations from mandatory coverage under Part 117, leaving air cargo operations subject to prior duty and rest rules under 14 C.F.R. Part 121 unless individual cargo carriers voluntarily "opt-in" to coverage under the new rule. Cargo operators were excluded not on the grounds of safety, but rather on cost considerations only (Final Rule, p. 336.)

The FAA does, however, acknowledge that factors that lead to fatigue are "universal" (Rule, p. 330.) The scientific research on fatigue has led to a number of uncontroversial findings about the causes of dangerous fatigue. For example, the FAA agrees that working during the Window of Circadian Low (WOCL), with repeated nighttime duty periods are particularly fatiguing and increase the risk of an accident, Final Rule p. 333.

Nevertheless, the FAA is permitting all-cargo operations to remain under Part 121, which continue to:

- Allow all-cargo operators to follow regulations that the FAA acknowledges do not adequately protect against fatigue.
- Ignore the latest research on fatigue and safety by excluding all-cargo operations from the new rules based only on the purported costs to all-cargo operators to comply with the new rule, Final Rule p. 332.
- Ignore the fact that all-cargo operations occur largely at night, across multiple time zones, and during the window of circadian low, and thus need greater protection against fatigue.

- Allow different duty and rest rules for different kinds of operations despite the recognition that fatigue affects all pilots in the same way regardless of the nature of the flight operation.

Based on the science of fatigue, air cargo operations should be subject to more stringent duty and rest requirements, not left subject to the outdated, admittedly inadequate rules that the NTSB has repeatedly urged be updated to reflect the latest research and that Congress directed be changed.

For a number of years, the NTSB included "Addressing Human Fatigue" in its "Most Wanted" list of measures to improve safety in transportation. As part of the recommendations to address fatigue, the NTSB recommended that DOT:

> Require the modal administrations to modify the appropriate Codes of Federal Regulations to establish scientifically based hours-of-service regulations that set limits on hours of service, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements. Seek Congressional authority, if necessary, for the modal administrations to establish these regulations. (I-99-1)

And that the FAA:

> Establish within 2 years scientifically based hours-of-service regulations that set limits on hours of service, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements. (A-99-45)

Congress adopted legislation in 2010 directing FAA to 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." Airline Safety and Federal Aviation Administration Extension Act of 2010, Pub. L. No. 111-216, § 212(a)(1), 124 Stat. 2348, 2362 (2010). The FAA adopted Part 117 in response.

The FAA is currently reexamining its decision to omit air cargo operations from Part 117, and is considering extensive comments from the IPA and others demonstrating that the FAA's assessment of the costs and benefits of applying Part 117 was flawed.

By omitting all-cargo operations from Part 117, the FAA is repeating its prior failures to address pilot fatigue, continuing to disregard the NTSB's recommendations, and failing to follow Congress's direction to adopt science-based flight and duty time regulations. Accordingly, the IPA requests that the NTSB formally recommend that the Federal Aviation Administration amend its current Flight Crew Member Duty and Rest Requirements, 14 C.F.R. Part 117, to include cargo operations.

In the interim, and until such time as FAR Part 117 coverage shall become mandatory for every cargo operator, the NTSB should recommend that UPS voluntarily opt-in to coverage under Part 117. On March 1, 2012, then U.S. DOT Secretary La Hood met with UPS officials and publically urged UPS to voluntarily opt-in to coverage under FAR Part 117.[1] At that time, UPS declined.

Since then, UPS Flight 1354 crashed during the early morning hours, precisely at the pilots' circadian low when human operators are the most vulnerable to the effects of fatigue. As a major air cargo carrier operating thousands of flights at all times of the day and night, UPS should conduct its operations under regulations specifically designed to combat the effects of pilot fatigue, FAR Part 117.

[1] See Reference 9

Recommendation 2

FAA mandate Safety Management Systems (SMS) that incorporate a joint partnership of airline management, labor representatives and all other stakeholders. Recommend that UPS, in conjunction with all stakeholders including its pilot employee representatives, take immediate steps to fully adopt a robust SMS system covering all UPS flight operations.

Supporting Information

The Safety Management System (SMS) is a strictly voluntary program, encouraged but not required by the Federal Aviation Administration (FAA). Thus, when the FAA proclaims SMS is a "formal, top-down business approach to managing safety ... including the necessary organizational structures, accountabilities, policies and procedures" (see www.faa.gov/about/initiatives/sms/) the words "required" or "mandated by the FAA" appear nowhere in the text. Operators may, or may not, implement SMS, and whatever program they implement will not be audited for effectiveness by the FAA.

UPS is lacking in an effort to implement the recognized safety benefits of SMS, the company regards SMS as a management tool in which employee involvement is not necessary. The company shows no inclination to involve IPA in SMS development and implementation. It is our position that a joint partnership to SMS will realize the greatest benefit.

At the request of the NTSB Board the IPA conducted an independent Safety Survey of the pilot group. (See Reference 3)

- 89% of respondents agreed (63% strongly, 26% somewhat) that fatigue prevention and mitigation is a joint responsibility of UPS management and IPA crewmembers.
- 90% of respondents disagreed (62% strongly, 28% somewhat) that UPS manages fatigue and prevents and mitigates fatigue risks in order to ensure safe fight operations.
- 96% of respondents have felt fatigued while on duty but did not call in fatigued.
- When asked why they did not call in fatigued when they felt so while on duty, the most common reasons cited by the respondents were:
    - Fear of retribution/punitive action/get suspended
    - Did not want my name highlighted in any way/spotlight myself to the company as a trouble maker

Recommendation 3

UPS incorporate any procedures from the reference-only manual Pilot Training Guide (PTG) into the Aircraft Operating Manual (AOM), which is an FAA approved document.

Supporting Information

Training at UPS is taught, and line operations are flown using two (2) different manuals. The Aircraft Operating Manual (AOM), a FAA approved document, and the Pilot Training Guide (PTG), which is reference only and not FAA approved. As referenced multiple times in the Operations Group Chairman's report, there are instances where policy and or procedures are only specified in the PTG.

In the Operations Group Chairman's report during simulator testing in Louisville, it was noted how important the application of the H.O.V.E. check is for re-sequencing the approach in the FMC.[2] This H.O.V.E. check is only found in the PTG and not referenced in the AOM. This is one example of why teaching from two separate manuals, the PTG and AOM, does not provide for a standardized training curriculum.

Crewmembers should not have to reference multiple source documents to maintain UPS standard operating procedures, especially when one of them is a "guide".

[2] See Reference 10

Recommendation 4

The FAA to require all Part 121 certificate carriers, in a timely manner, to adopt and utilize the most current software available for installed safety equipment. This would include, but not be limited to EGPWS, TCAS and GPS.

Supporting Information

Aircraft Performance Study – Docket No. SA-538, 550789 Pages 25, 27

VIII. Go-around maneuvers in the A300-600 engineering simulator

As indicated in Table 3 and multiple Figures in this *Study*, the EGPWS "too low terrain" warning on the CVR came 1 second after the "first sound of impact," and so was not able to alert the crew in time for them to take action to avoid descending into the trees. The function and performance of the EGPWS system is described in the *System Group Chairman's Factual Report* (Ref. 6). Ref. 6 also presents information that indicates that an updated version of the EGPWS software (version -218) would have provided the "too low terrain" warning at about 04:47:27, or about 6.5 seconds earlier than that provided by the software version installed on the accident airplane (version -212). It is of interest to know whether this earlier alert would have been timely enough for the crew to have taken action to avoid the accident.

Item	Selected vertical speed change	TOGA / automated go-around	Manual terrain-avoidance maneuver
Minimum altitude reached, feet MSL	1580	1610	1640
Altitude lost in maneuver, feet (V/S = -1500 ft./min.)	120	90	60
Altitude lost in maneuver, feet (V/S per Figure 31)	n/a	89	49
Minimum altitude for successful go-around, ft. MSL	942	911	871
Time at minimum altitude for successful go-around	04:47:26.3	04:47:27.6	04:47:29.4
Time at EGPWS "too low terrain" (-218 software)	04:47:27.0	04:47:27.0	04:47:27.0
Allowable reaction time, seconds	-0.7	0.6	2.4

Table 8. Results of three different go-around maneuvers in the A300-600 engineering simulator.

Recommendation 5

Prohibit Height Group 4 aircraft from using Runway 18 in BHM as the Precision Approach Path Indicator (PAPI) is certified for Height Group 3 aircraft or smaller.

Supporting Information

From the Survival Factors - Factual Report of Group Chairman (Docket #550138):

> FAA Order JO 6850.2B defines the TCH as "the height of the lowest on-course [PAPI] signal at a point directly above the intersection of the runway centerline and the threshold." The Order also cautions that: "The minimum allowable TCH varies according to the height group of aircraft that use the runway… The PAPI approach path must provide the proper TCH for the most demanding height group that uses the runway." FAA Advisory Circular (AC) 150/5340-30G *Design and Installation Details for Airport Visual Aids*, contains identical language describing the need to match TCH with airplane height.
>
> On November 8, 2013, the FAA Program Manager at the Jackson ADO responded with the following:
>
> > "The PAPI for Runway 18 was designed for height group 3 aircraft. The PAPI was not designed for height group 4 aircraft; therefore, it does not meet standards for height group 4 aircraft."

Reference 1

1. List of fatigue reference material:

   a. Co, E.L, et al. Crew Factors in Flight Operations XI: A survey of fatigue factors in regional airline operations. NASA/TM report no.199-208799.

   b. Michael B. Mann, Deputy Associate Administrator, NASA, Hearing on Pilot Fatigue, Aviation Subcommittee of the Committee on Transportation and Infrastructure, United States House of Representatives, August 3, 1999.

   c. Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue, NTSB/SR 99/01, May 1999.

   d. Dawson, D and Reid, K. Fatigue, alcohol and performance impairment, Nature, 388, 1997, 235.

   e. Roehrs T; Burduvali E; Bonahoom A et al. Ethanol and sleep loss: a “dose” comparison of impairing effects. Sleep 2003; 26(8):981-5.

   f. Tepas DI, Carvalhais AB., Sleep patterns of shiftworkers, Occup Med. 1990 Apr-Jun;5(2):199-208.

   g. Russo MB, Stetz MC, Thomas ML. Monitoring and predicting cognitive state and performance via physiological correlates of neuronal signals. Aviat Space Environ Med. 2005 Jul;76(7 Suppl):C59-63.

Reference 2

Chairman Deborah Hersman Concurring Statement, p162-168, Loss of Control on Approach Colgan Air, Inc. Operating as Continental Connection Flight 3407 Bombardier DHC-8-400, N200WQ Clarence Center, New York February 12, 2009, NTSB/AAR-10/01, PB2010-910401

(See below)

Notation 8090A
Chairman Hersman, Concurring:

This accident refocuses much needed attention on many long-standing issues of concern to the Safety Board – issues such as flight crew monitoring, pilot performance and training, sterile cockpit rules, FAA oversight, and the use of personal electronic devices, among others. I commend our staff for holding a public hearing and completing a thorough investigation in advance of the one-year anniversary of the accident. Their accomplishment was significant and had a tremendous impact on identifying critical concerns in the aviation industry.

I voted in support of the findings, the probable cause and the recommendations and, along with my colleagues, supported the adoption of the final report. However, during the public Board meeting, I submitted a proposal to the Board to amend the probable cause by adding fatigue as a fifth contributing factor, specifically that the flight crew members' fatigue contributed to the accident because they did not obtain adequate rest before reporting to duty. After open discussion, the Board rejected the amendment 2 to 1. While I would have preferred for fatigue to be included in the probable cause, that in no way diminishes my support for the Board's final product which I believe advances aviation safety.

Let me explain why I think fatigue, an issue that has been on our Most Wanted List of Transportation Safety Improvements since its inception in 1990, was a factor in this accident. Numerous accident investigations, research data and safety studies show that operators, like the flight crew in this accident, who are on duty but have not obtained adequate rest present an unnecessary risk to the traveling public. Fatigue results from continuous activity, inadequate rest, sleep loss or nonstandard work schedules. The effects of fatigue include slowed reaction time, diminished vigilance and attention to detail, errors of omission, compromised problem solving, reduced motivation, decreased vigor for successful completion of required tasks and poor communication, and generally results in performance deficiencies like those present during this accident flight. As we conclude in the accident report, the flight crews' errors, including the captain's inappropriate response to the activation of the stick shaker and the flight crews' failure to monitor air speed, adhere to sterile cockpit procedures and adequately monitor the flight, were the causal and contributing factors of this accident. But I also believe that these errors are consistent with fatigue.

According to the FAA, operator fatigue is one of the most persistent hazards in all travel modes, including commercial aviation.[1] The Safety Board has examined operator fatigue in its safety studies on flight crew errors,[2] commuter airlines,[3] and aviation safety in Alaska.[4] In the flight crew study, the Board found that crews, comprised of captains and first officers whose time since awakening was above the median for their crew position, made more errors overall. In the study on commuter airline safety, the Board found that self-reports from commuter airline pilots indicated that most pilots had flown while fatigued. In the study on aviation in Alaska, the Board concluded that the consecutive, long duty days, permitted by Title 14 *Code of Federal Regulations* (14 CFR) Part 135.261 for commuter airline and air taxi flight crews

[1] Federal Aviation Administration, SAFO 06004; Approach and Landing Accident Reduction: Sterile Cockpit, Fatigue. 04/28/06.
[2] National Transportation Safety Board,1994. *A Review of Flightcrew-Involved, Major Accidents of U.S. Air Carriers, 1978 Through 1990.* Safety Study NTSB/SS-94/01.
[3] National Transportation Safety Board, 1994. *Commuter Airline Safety.* Safety Study NTSB/SS-94/02.
[4] National Transportation Safety Board, 1995. *Aviation Safety in Alaska.* Safety Study NTSB/SS-95/03.

in Alaska, can contribute to fatigue and are a detriment to safety.[5] A 1999 NASA study found that 80% of regional airline pilots said they had nodded off during a flight,[6] and fatigue continues to show up in reports in NASA's Aviation Safety Reporting System.[7]

The question is why, after more than 40 years of documentation and investigation of the hazards of fatigue, so little has changed in our identification of fatigue as a causal or contributing factor in accidents. I would like to contrast how we have addressed fatigue with two other human factors issues that have matured in the last four decades -- alcohol impairment and adherence to standard operating procedures (SOPs).

Today, the impairing effects of alcohol are well understood and accepted by NTSB investigators and society at-large. However, this has not always been the case. Early in the Safety Board's history, the prevailing view was that an individual could be under the influence with a blood alcohol content above today's legal limit, and still not be considered drunk. For example, we investigated the 1967 collision in Baker, California, between a car travelling the wrong way on the highway and a bus which resulted in 20 fatalities and 11 injuries.[8] The NTSB calculated that at the time of the collision, the driver of the car had a blood-alcohol level of between .15 and .19 (or higher). Nonetheless the accident report states that "there is a difference between being "under the influence" of alcohol and varying degrees of drunkenness. In the common acceptance of the term, "drunkenness" is taken to mean that a person is in a helpless state of immobility." The report goes on to determine that the driver was not "drunk" because prior to the accident he successfully traveled around town by car, talked with friends and "therefore, it is logical to believe that he was able to read, comprehend and respond to traffic control devices, although probably not as well or as quickly as if he were sober." In the report, alcohol was not cited as one of the probable cause factors; it was listed as a contributing factor. The Safety Board concluded that because the driver was not immobilized by the alcohol, alcohol was not a causal factor. The use of alcohol, to a certain extent, was tolerated in the transportation industry and by society in general if an impaired individual could still function at some level.

Fortunately, we have advanced beyond this limited viewpoint. Alcohol testing is now a routine component of our accident investigations, and society has placed stricter limits on alcohol use. Today, safety-sensitive transportation employees are subject to random and post-accident drug and alcohol testing, and every state now has impaired driving laws with an .08 or higher breath or blood concentration legal limit. Federal regulations establish an even lower .04 limit for transportation professionals.

Fatigue-impaired performance is not unlike alcohol-impaired performance. For example, a 2003 study demonstrated that sleep loss is at least as potent as ethanol in its performance-impairing effects and two hours of sleep loss equates to a breath ethanol concentration of approximately .05%.[9] Other studies establish that prolonged wakefulness significantly impairs speed and accuracy, hand–eye coordination,

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[5] Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue, NTSB/SR-99/01, May 1999.

[6] Co, E.L, et al. Crew Factors in Flight Operations XI: A survey of fatigue factors in regional airline operations. NASA/TM report no.199-208799.

[7] Michael B. Mann, Deputy Associate Administrator, NASA, Hearing on Pilot Fatigue, Aviation Subcommittee of the Committee on Transportation and Infrastructure, United States House of Representatives, August 3, 1999.

[8] National Transportation Safety Board, Interstate Bus Automobile Collision on Interstate Route 15, Baker, California, March 7, 1968.

[9] Roehrs T; Burduvali E; Bonahoom A et al. Ethanol and sleep loss: a "dose" comparison of impairing effects. *Sleep* 2003; 26(8):981-5.

decision making, and memory,[10] and one study, in fact, correlates prolonged wakefulness with impairment, such that being awake for 16 hours is equivalent to a .05 BAC.[11]

We have successfully identified the problem of impairment due to alcohol and drugs in the workplace, and the regulators and industry have devised rules, testing and treatment countermeasures to address the problem. The challenge we face now is creating an environment in which to identify the impairing effects of fatigue. Whether it is using predictive scheduling tools, technology such as eye or voice assessment, administering self tests to quickly assess fatigue or even coming up with a blood test to identify the extent to which fatigue is affecting an individual's ability to be vigilant, react quickly and avoid both lapses of attention and response errors – we need to address this critical problem.[12]

Another example of the progress we have made during the Safety Board's four decades-long investigations of human factors is adherence to Standard Operating Procedures, such as the sterile cockpit rule (prohibiting extraneous conversation below 10,000 feet). We have made the connection between violating the sterile cockpit rule and creating a lax environment in the cockpit that results in crews not being attentive to the task at hand. Today, for sterile cockpit violations to be cited in the probable cause, crews do not have to be engaged in a conversation at the time the accident sequence commences; the conversation just has to be present at some point during the flight.

An example of how far this concept has advanced was brought to my attention a few years ago in a petition for reconsideration for a 1967 mid-air collision of Piedmont Airlines flight 22, a Boeing 727, with a twin engine Cessna 310. The 727 was departing Asheville Regional Airport in North Carolina and the Cessna was on approach to the same airport. All 82 people aboard both aircraft were killed. The petition for reconsideration raised three points, one of which was that the NTSB report made no mention of a fire in a cockpit ashtray that preoccupied the Piedmont crew in the final 35 seconds before the collision. The time that lapsed from take-off to collision was only about 2 minutes and 37 seconds, however, the final accident report's only reference to the crew's recorded cockpit conversation stated that it was "concerned primarily with the operation of the aircraft and nothing was found of a probative value to the investigation." As difficult as it is to believe, the crew's preoccupation with the fire was not mentioned in the final report.

We have certainly come a long way. Today, extraneous conversation in the cockpit while under 10,000 feet is an unacceptable safety hazard and has regularly been cited as a causal or contributing accident factor. Like with fatigue, we do not have a test to demonstrate the degree to which a sterile cockpit violation affects a crew's performance. We similarly do not require that any causal or contributing factor equate to a percentage or share of the cause of an accident. Nonetheless, the Safety Board recognizes that a sterile cockpit violation can be a contributing factor for an accident, as was the case in this accident. In this accident, the crew was not behind in their checklists and had not violated the sterile cockpit rule in the two minutes prior to the upset. However the Board did believe that the sterile cockpit violation earlier in the flight created an "environment" where errors were not detected or recognized. Consequently, the sterile cockpit violation was one of four contributing factors to the accident. The exact same logic should be applied to our determination of fatigue; we can demonstrate that the crew was fatigued at the time of the accident and consistent with research, data and science, fatigue results in performance deficiencies that were displayed by the crew. Thus, fatigue should be included as a contributing factor.

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[10] Babkoff et al., 1988; Florica et al., 1968; Gillberg et al., 1994; Linde and Bergstrom, 1992; Mullaney et al., 1983.
[11] Dawson D, Reid K: Fatigue, alcohol and performance impairment. *Nature* 1997; 388: 235.
[12] Fatigue Management in Transportation Operations. 2009 International Conference; http://depts.washington.edu/uwconf/fmto/FatigueManagementAbstracts.pdf.

Just as the aviation industry, including the NTSB, has addressed alcohol use and adherence to SOPs, it must also address the issue of fatigue. Unlike many of our complex, technical or cutting edge findings that require further explanation to the public to show why we made the finding, I believe this situation is one that requires an explanation of why we did not reach a conclusion – that is, why we did not identify fatigue in the probable cause determination. Anyone who has attempted to overnight in a crew lounge, an office or an airport waiting room, or has tried to get a night's sleep on a red-eye flight from Seattle to Newark will tell you, this type of sleep in not recuperative, and the data and science support this. Anyone who has a new baby at home or is caring for an ill relative can tell you that interrupted sleep is not restorative sleep, and studies support this. Any employee who is asked to remain awake throughout the day and be prepared for the most demanding portion of their workday at 10pm after they have been awake for at least 15 consecutive hours would likely acknowledge that they are not at peak performance, and research supports this. Safety Board studies indicate that the duration of the most recent sleep period, the amount of sleep during the previous 24 hours, and split or fragmented sleep patterns are among the most critical factors leading to fatigue-related accidents.[13]

The failure of the Safety Board to include fatigue as one of the contributing factors in this accident is symptomatic of the Board's inconsistent approach to addressing fatigue in transportation accidents. We have developed a methodology to be used by our investigators in our on-going efforts to address fatigue in accident investigations through a fatigue checklist.[14] It is not necessary for fatigue to be the sole cause of an accident, but it should be included as a factor when it is present and performance deficiencies consistent with fatigue are identified. In 1999 the NTSB recognized that, "[a]lthough generally accepted as a factor in transportation accidents, the exact number of accidents due to fatigue is difficult to determine and likely to be underestimated. The difficulty in determining the incidence of fatigue-related accidents is due, at least in part, to the difficulty in identifying fatigue as a causal or contributing factor in accidents. There is no comparable chemical test for identifying the presence of fatigue as there is for identifying the presence of drugs or alcohol; hence, it is often difficult to conclude unequivocally that fatigue was a causal or contributing factor in an accident. In most instances, one or more indirect or circumstantial pieces of evidence are used to make the case that fatigue was a factor in the accidents."[15]

There is consensus at the Safety Board that the flight crew in this accident was likely fatigued, and our accident report makes this conclusion. The factual information in the docket establishes the presence of fatigue for both of these crew members.[16] The captain spent the night before the accident sleeping in the company crew room, where he obtained, at best, 8 hours of interrupted sleep as evidenced by multiple log-ins to the CrewTrac system at 2151, then 0310 and again at 0726. At worst, it was poor-quality, interrupted sleep of a shorter duration. NASA and other studies show that even in an onboard rest facility with beds available for long haul flight crews, pilots might get three hours of sleep and the quality does not approach 'home' sleep.[17] So, conservatively, the captain in this accident obtained 2 fewer hours sleep than his usual sleep and perhaps, significantly less based on the quality of sleep. In addition to this acute

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[13] National Transportation Safety Board, *Factors That Affect Fatigue in Heavy Truck Accidents*, Highway Safety Study NTSB/SS-95/01 (Washington, D.C.: NTSB, 1995).

[14] http://www.ntsb.gov/info/fatigue_checklist_V%202_0.pdf.

[15] SR99-01 - Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue

[16] National Transportation Safety Board, Aircraft Accident Report: Crash on Approach to Airport Colgan Air, Inc. Operating as Continental Connection Flight 3407 Bombardier DHC-8-400, N200WQ Clarence Center, New York, Feb. 12, 2009, Human Performance Group Chairman Factual Report, Docket No. SA-531, and Addendum 1 DCA09MA027.

[17] Rosekind, M.R., Gregory, K.B., Miller, D.L., Co, E.L. (2000). Crew factors in flight operations XII: A survey of sleep quantity and quality in on-board crew rest facilities. (Technical Memorandum 2000-20961). Moffett Field, CA: NASA and Rosekind, M. R., Gregory, K. B., Miller, D. L., Oyung, R. L., Neri, D. F., & Dinges, D. F. Sleep quantity and quality of augmented long-haul flight crews in on-board crew rest facilities. *Sleep Research*, 1997, 26:41.

sleep loss, he had a cumulative sleep debt of between 6 and 12 hours, which reflected the 2 to 4 hours of sleep debt he accumulated over the course of each of the preceding three nights, two of which were spent in the crew lounge. At the time of the accident, he had been awake at least 15 hours – 3 hours more than the level at which the 1994 NTSB study identified performance degradation in accident flight crews. Finally, the accident occurred at the time of day when the captain would normally go to sleep.

The first officer was similarly not properly rested. The night before the accident, she commuted from Seattle to Newark, changing planes shortly after midnight in Memphis, and arriving in Newark at 0630, which was 0300 Seattle time. While she may not have experienced cumulative sleep debt, she likely had some acute sleep loss and, in the preceding 34 hours, had only gotten a maximum of 8.5 total hours of sleep – 3.5 hours of which were while traveling overnight cross-country (1 ½ hours from Seattle and 2 hours from Memphis to Newark), and the remaining 5 while resting in the company crew room. However, based on information contained in the docket including an interview of a flight attendant who had a conversation with the first officer during the 1100 hour, the 5 hours of rest in the crew lounge between 0800 and 1300 are questionable. Again, it is not likely that she obtained recuperative sleep in a busy, well-lit crew room.

Reflective of these facts, the Safety Board accident report concludes that "[t]he pilots' performance was likely impaired because of fatigue…" However, the report diminishes the significance of this finding when it states that "[sic] the extent of their impairment and the degree to which [fatigue] contributed to the performance deficiencies that occurred during the flight cannot be conclusively determined." More simply, the report concludes that while fatigue likely impaired the pilots' performance, because we could not assign fatigue a percent or number, we discount it as a contributing factor of the accident.

This approach is not consistent with our determinations in other accident investigations. For example in the collision between a truck and an Amtrak train in Bourbonnais,[18] the Safety Board stated that "despite the fact that the truck driver was suffering from fatigue at the time of the accident, investigators could not determine the extent to which fatigue accounted for his performance" (analysis page 55). However, that did not prevent the Board from citing in the probable cause for the accident the truck driver's "inappropriate response to the grade crossing warning devices and his judgment, likely impaired by fatigue." Similarly, in a collision between two trains in Macdona, Texas,[19] the Safety Board concluded that "neither the engineer nor the conductor of the Union Pacific Railroad train made effective use of the time that was available to them to obtain rest." In that accident, the Safety Board identified fatigue as the cause of the crew's inappropriate response to wayside signals governing the movement of their train. Contributing to the crewmembers' fatigue was their failure to obtain sufficient restorative rest prior to reporting for duty because of their ineffective use of off-duty time and the company scheduling practices which inverted their sleep cycles. In the 1989 grounding of the U.S. tank ship *Exxon Valdez*, many recall the intoxication of the ship's Captain, but this was also a significant fatigue accident. Fatigue was identified as a major contributor that, subsequently, was given serious national and international attention when the Board stated that "there were no rested deck officers on the *Exxon Valdez* available to stand the navigation watch when the vessel departed from the Alyeska Terminal."[20] Fatigue was cited in the probable cause of the accident.

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[18] National Transportation Safety Board, Collision of National Railroad Passenger Corporation (Amtrak) train 59 with a loaded truck-semitrailer combination at a highway/rail grade crossing in Bourbonnais, Illinois, March 15, 1999.

[19] National Transportation Safety Board, Collision of Union Pacific Railroad Train MHOTU-23 With BNSF Railway Company Train MEAP-TUL-126-D With Subsequent Derailment and Hazardous Materials Release; Macdona, Texas; June 28, 2004; RAR0603.

[20] National Transportation Safety Board, Grounding of U.S. Tank ship Exxon Valdez on Bligh Reef, Prince William Sound Near Valdez, Alaska, March 04 1989. NTSB/ MAR-90/04, Washington D.C.: NTSB.

In other more recent Safety Board aviation accident investigations, the Board concluded that fatigue – even if unquantifiable – caused or contributed to the accident. For example, in the Shuttle America accident in Cleveland in 2007[21], the Board determined that fatigue was one of four contributing factors, such that the captain's fatigue affected his ability to effectively plan for and monitor the approach and landing. Also in 2007, in our investigation of the Pinnacle, Traverse City accident,[22] the Board found that poor decision making by the pilots likely reflected the effects of fatigue produced by a long, demanding duty day. In another case, the 2004 Kirksville, Missouri accident,[23] the Board found that the pilots' fatigue likely contributed to their degraded performance. It is important to note that similar to this accident, in the CVR transcripts for both the Shuttle America and Kirksville accidents, the crewmembers are engaged in conversation throughout the flight, chatting about various topics, and in the Kirksville accident their sterile cockpit violation is also cited in the probable cause. In each of these investigations, the Safety Board determined that fatigue caused or contributed to the accident. We should be making a similar determination here.

Presently, we do not have the tools to conclusively determine the degree to which a person is fatigued. We cannot pinpoint whether fatigue results in 20% memory reduction, 50% degraded decision-making ability, 25% slower reaction time, or some other value for each individual. This difficulty, however, does not mean we cannot – or should not – find that fatigue contributed to the accident. Making a determination that fatigue is a contributing factor does not detract from this accident report's other determinations, nor is it an all-or-nothing proposition. A captain can be a poor performer and also be fatigued. The crew may violate the sterile cockpit rules and be fatigued. A first officer may not adhere to standard operating procedures and also be fatigued.

The issue of fatigue challenges us to periodically adjust our lens and take a fresh look to ensure that the aviation industry and the crews who fly our skies report to work rested and fit for duty. Fatigue is complex and multifaceted. During my time at the Board, we have issued recommendations about sleep disorders, flight and duty time revisions, fatigue management systems, education and training. I suggest that our failure to identify fatigue as a factor in this accident is not just a missed opportunity, but also turns a blind eye to a situation that even the average person can recognize. We are never going to change the debate on fatigue unless we face it head on. That means dealing with all aspects of fatigue – from revising the hours of service to sleep disorders to personal responsibility to commuting.

Flight crew commuting is particularly challenging. A regional flight crew's home base changes often, and to offset the disruption of frequent relocations, pilots may commute from a home location. The Colgan Air pilots were commuting pilots. Both pilots were based in ERW but the captain lived in Florida and the first officer in Seattle. During the previous 14 months, the first officer lived in Phoenix (when hired by the company), then expected to be based in Houston before being sent to Norfolk, Virginia and then at the time of the accident, was based in Newark, New Jersey but lived in Seattle, Washington. Flight crew salaries are also problematic. It is financially challenging for pilots, whether earning $60,000 or $16,000, to regularly relocate their families or hold down multiple residences. When the FAA convened the fatigue

[21] National Transportation Safety Board, Aircraft Accident Report: Runway Overrun During Landing Shuttle America, Inc. Doing Business as Delta Connection Flight 6448 Embraer ERJ-170, N862RW Cleveland, Ohio February 18, 2007. AAR-08-01

[22] National Transportation Safety Board, Aircraft Accident Report: Runway Overrun During Landing Pinnacle Airlines Flight 4712 Bombardier/Canadair Regional Jet CL600-2B19, N8905F Traverse City, Michigan April 12, 2007, AAR-08-02.

[23] National Transportation Safety Board, Aircraft Accident Report: Collision with Trees and Crash Short of Runway, Corporate Airlines Flight 5966, British Aerospace BAE-J3201, N875JX, Kirksville, Missouri, October 19, 2004. AAR-06-01.

ARC in the summer of 2009, they took commuting off the table, and neither Colgan, nor ALPA addressed the issue of commuting in their accident submission documents, even though 70% of the pilots based in Newark commute and 20% commute from over 1000 miles away. I recognize that an objective analysis of commuting will be a difficult, and perhaps, uncomfortable discussion. But we should not be afraid to confront this issue in the context of understanding fatigue and its effect on pilot performance.

The one constant throughout this discussion is that the causes of fatigue among pilots are fairly well-defined and that the results of fatigue, namely accidents of varying degrees, are well-known. Unfortunately, in the aviation industry, fatigue-related decisions – such as minimum crew hires, flight crew schedules and commuting – are decisions that too often reflect the economics of the industry, rather than the data and science of fatigue and human performance.

The tragedy in this accident report is that what we uncovered in the investigation, we already knew. The FAA talks about safety being their highest priority. Colgan Air's slogan was never to compromise safety. The pilots want a safe profession. Yet, if we are serious about safety, we must establish an aviation system that minimizes pilot fatigue and ensures that flight crews report to work rested and fit for duty. Flying tired is flying dangerously, and it is a practice that needs to end.

Reference 3

IPA Safety Survey, April 8, 2014

- Introductory Statement
- Questions/Data
- CURRICULUM VITAE of Merrill M. Mitler, Ph.D.
- Power Point Presentation

(See below)

INDEPENDENT PILOTS ASSOCIATION

TO: **National Transportation Safety Board**
FROM: **Independent Pilots Association**
RE: **Safety Survey Executive Summary**
DATE: **April 8, 2014**

As a result of the NTSB's request for further data, IPA conducted a survey of its pilots about safety and fatigue. The survey was devised and drafted by a team of leading industry experts, including: Dr. Merrill Mitler, Ph.D., a recognized sleep and fatigue expert and Steven Wallace, former FAA Director, Office of Accident Investigation; with guidance from Mark Allen of AmericanPublic.us a policy and polling firm in Washington, D.C. The survey was conducted between March 7 & 16, 2014. 2,202 IPA crewmembers had completed the survey for a response rate of 92.59%. The margin of error for this survey is +/- 0.57% at the 95% confidence interval. Results indicate multiple concerns related to safety and fatigue in UPS flight operations. Some noteworthy results are:

- 90% of Respondents disagree (62% - strongly, 28% - somewhat) that UPS manages fatigue threats and prevents and mitigates fatigue risk in order to ensure safe flight operations (Question 3).

- 89% of Respondents disagree (68% - strongly, 21% - somewhat) that UPS mitigates fatigue risk when trends or threats associated with schedules, pairings or trips are identified to them (Question 5).

- 88% of Respondents agree (58% - strongly, 30% - somewhat) that calling in fatigued will invite adverse scrutiny from UPS (Question 19). 80% of Respondents agree (42% - strongly, 38% - somewhat) that calling in sick will invite adverse scrutiny from UPS (Question 20).

- Results for survey items pertaining to reporting fatigue indicate that Respondents disagree that reporting fatigue risk is non-punitive. Case in point, 84% of Respondents disagree (58% - strongly, 26% - somewhat) that UPS encourages crewmembers, in a non-punitive manner, to report fatigue risk that they encounter or see (Question 6).

- 93% of Respondents agree (62% - strongly, 31% - somewhat) that it is not uncommon to fly with another crewmember who exhibits signs of fatigue (Question 18).

- 89% of Respondents agree (63% - strongly, 26% - somewhat) that fatigue prevention and mitigating the effects of fatigue is a joint responsibility of UPS and IPA crewmembers (Question 7).

- Results for survey items pertaining to training indicate that Respondents disagree that UPS fatigue training is adequate. Case in point, 68% of Respondents disagree (46% - strongly, 22% - somewhat) that the UPS fatigue risk management plan and training have helped the member recognize the threats of fatigue in themselves and co-workers (Question 9).

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- 95% of Respondents agree (69% - strongly, 26% - somewhat) that schedules would improve from a fatigue/safety standpoint if there were an effective IPA and UPS partnership in creating the pairings and lines (Question 24).

- 78% of Respondents disagree (53% - strongly, 25% - somewhat) that adequate sleep rooms are available for crewmembers throughout the UPS system (Question 29).

- With respect to perceived causes of fatigue, inspection of results (Question 32) indicates that the following factors are most commonly cited as the #1 cause of fatigue:
  - Pairing/trip construction
  - Flying the back side of the clock
  - Day-flying and night-flying (Circadian flip) in consecutive duty periods
  - Line construction (a line = all pairings within a pay period)
  - 24-hour layovers

- 96% of Respondents have felt fatigued on duty but did not call in fatigued (Question 35).

- When asked why these Respondents did not call in fatigued when they felt fatigued on duty, the most common reasons cited were:
  - Fear of retribution/punitive action/ get suspended.
  - Did not want my name highlighted in any way/spotlight myself to the company as a trouble maker.

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IPA Safety Survey
FINAL TOPLINE
N = 2,202 Active IPA Pilots
Field Dates: March 7-16, 2014
Margin of Error = 0.57% at the 95% Confidence Interval

Demographics

D1. What is your age?

Under 40	3%
40-54	42%
55-59	49%
Over 60	6%

D2. What is your Year of Hire?

1988-1993	26%
1994-1996	23%
1997-2004	27%
2005+	24%

D3. Which fleet do you fly?

A300	16%
MD11	22%
747	13%
757/767	48%

D4. Which seat do you fly?

Captain	46%
First Officer	54%

D5. Where are you domiciled?

ANC	21%	83
MIA	7%	79
ONT	8%	89
SDF	64%	78

D6. What types of lines are you normally awarded?

Hard Line	64%
VTO	16%
Reserve	20%

D7. Which do you currently fly the most, international or domestic?

International	55%
Domestic	45%

D8. Do you normally work in the Training Center?

Yes	2%
No	98%

D9. Are you a Commuter or do you live in Domicile?

Commuter	56%
Non-Commuter	44%

D10. [IF D9 = COMMUTER, n = 1,223] How do you primarily get to work?

Drive personal vehicle	9%
Jump seat on UPS	51%
Jump seat on another carrier	13%
Bid for commercial tickets	22%
Other [SPECIFY]	6%

D11. [IF D9 = COMMUTER, n = 1,223] How long does it typically take you to commute roundtrip from your domicile? [OPEN END NUMERIC RESPONSE]

1-2 hours	9%
3-6 hours	32%
7-12 hours	30%
13-23 hours	20%
24 hours +	9%

D12. Gender [Male, Female]

Male	95%
Female	5%

Introductory Question

Q1. Which one of the following best describes your current work life at UPS?

1% *Very satisfactory:* nothing needs to change
35% *Somewhat Satisfactory:* a few things need to be changed
34% *Mixed:* about half is good, half is bad
26% *Somewhat Unsatisfactory:* significant changes are needed
4% *Very Unsatisfactory:* everything needs to change

Q2. How would you rate UPS' overall commitment to safety?

3% Excellent
18% Good
34% Average
30% Below average
16% Poor

Fatigue Questions

Now you are going to see a series of statements. After you have read each statement, you will indicate whether you agree or disagree with that statement and how strongly you feel about that agreement or disagreement. You may also choose a response that indicates that you neither agree nor disagree with the statement or that you don't know enough about that particular issue to offer a response. Please read each statement carefully and indicate your response with the radio buttons that appear beside each question.

	Strongly Agree	Somewhat Agree	Neither	Somewhat Disagree	Strongly Disagree	Unsure
UPS manages fatigue threats, and prevents and mitigates fatigue risk in order to ensure safe flight operations. (Q3)	0%	3%	6%	28%	62%	1%
IPA crew members themselves are personally responsible to ensure that they are adequately rested and fit for flight duty. (Q4)	39%	40%	7%	9%	4%	1%
UPS mitigates fatigue risk when trends or threats associated with schedules, pairings, or trips are identified to them. (Q5)	1%	2%	5%	21%	68%	3%
UPS encourages crewmembers, in a non-punitive manner, to report fatigue risk that they encounter or see. (Q6)	1%	4%	7%	26%	58%	3%
Fatigue prevention and mitigating the effects of fatigue are joint responsibilities of UPS and IPA crew members. (Q7)	63%	26%	3%	4%	3%	1%
UPS provides adequate fatigue training in new hire orientations, and annually in recurrent training. (Q8)	1%	4%	13%	24%	54%	5%
The UPS Fatigue Risk Management Plan (FRMP) and training have helped me to recognize the threats of fatigue in myself and co-workers. (Q9)	1%	8%	20%	22%	46%	3%
UPS values safety over making service. (Q10)	1%	7%	8%	29%	54%	1%
UPS honors an IPA crew member's self-assessment and self-removal from duty because of fatigue, without coercion, retribution or punitive action. (Q11)	1%	6%	7%	29%	52%	5%
UPS Fatigue Event Reports adequately protect the privacy of the crew member submitting the report. (Q12)	2%	8%	19%	14%	22%	36%

Q13. How familiar would you say you are with the UPS Fatigue Risk Management Plan (FRMP)?

13% Very familiar
42% Somewhat familiar
29% Not very familiar
16% Not familiar at all

Q14. [ASK Q14 ONLY IF Q13 = 1-3, n = 1,842, OTHERWISE GO TO Q15] How much confidence would you say you have in the UPS Fatigue Risk Management Plan (FRMP)?

0% A great deal of confidence
9% Some confidence
47% Not very much confidence
34% No confidence at all
9% Unsure – don't know enough about the plan to evaluate it

Q15. How effective would you say UPS is in addressing fatigue issues within their control such as creating schedules, rescheduling, rest, duty limitations and utilization of reserve crew members?

0% Very effective
4% Somewhat effective
38% Not very effective
57% Not effective at all
1% Unsure

Q16. How effective would you say you are in addressing fatigue issues within your control?

20% Very effective
71% Somewhat effective
7% Not very effective
1% Not effective at all
1% Unsure

Q16-1. As a front-line employee, do you feel you are a critical part of the safety process, to include the UPS Safety Management System (SMS)?

39% Yes, definitely
27% Yes, probably
17% No, probably not
9% No, definitely not
8% Unsure

Now you are going to see another series of statements. As before, you will indicate whether you agree or disagree with the statement and how strongly you feel about that agreement or disagreement. You may also choose a response that indicates you neither agree nor disagree with the statement or that you don't know enough about that particular issue to offer a response. Please read each statement carefully and indicate your response with the radio buttons that appear beside each question.

	Strongly Agree	Somewhat Agree	Neither	Somewhat Disagree	Strongly Disagree	Unsure
IPA crew members are more likely to call in sick rather than removing themselves from duty due to fatigue. (Q17)	53%	32%	7%	1%	2%	5%
It is not uncommon to fly with another crew member who exhibits signs of fatigue. (Q18)	62%	31%	4%	2%	1%	0%
Calling in fatigued will invite adverse scrutiny from UPS. (Q19)	58%	30%	5%	2%	1%	3%
Calling in sick will invite adverse scrutiny from UPS. (Q20)	42%	38%	8%	8%	2%	1%
I sometimes feel pressured by UPS to fly while fatigued. (Q21)	35%	38%	17%	5%	3%	2%
I sometimes feel pressured by UPS to fly while sick. (Q22)	19%	26%	21%	16%	17%	1%
The UPS culture encourages you to call in fatigued when you are fatigued. (Q23)	1%	2%	5%	23%	68%	1%
Schedules would improve, from a fatigue/safety standpoint, if there were an effective IPA and UPS partnership in creating the pairings and lines. (Q24)	69%	26%	2%	1%	1%	2%
Current UPS scheduling practices take into account fundamentals of human physiology including the latest science on circadian rhythms and fatigue. (Q25)	1%	1%	2%	14%	80%	2%
The on-board rest facilities on the B747-400 are adequate for in-flight rest. (Q26)	40%	23%	7%	3%	1%	26%
The on-board rest facilities on the MD-11 are adequate for in-flight rest. (Q27)	10%	37%	12%	14%	8%	19%
The on-board rest facilities on the B767 are adequate for in-flight rest. (Q28)	1%	0%	1%	2%	93%	3%
Adequate sleep rooms are available for crew members throughout the UPS system. (Q29)	1%	10%	8%	25%	53%	3%
The sleep rooms in the Louisville domicile are adequate for mitigating fatigue.. (Q30)	16%	43%	11%	18%	8%	4%

Q31. [IF Q29 = DISAGREE, n = 1,717] You previously indicated that you felt adequate sleep rooms were not available throughout the UPS system. Being as specific as you can, please identify those gateways where you would most like to see improvements in sleep facilities. You may indicate using city names or 3-letter IATA airport codes.

48%	PHL/ KPHL/ Philadelphia
46%	EWR/ KEWR/ Newark
41%	ONT/ KONT/ Ontario
34%	RFD/ KRFD/ Rockford
25%	SDF/ KSDF/ Louisville
22%	CGN/ Cologne
19%	DFW/ KDFW
17%	SZX/ Shenzen
16%	ANC/ Anchorage
12%	MIA/ KMIA
7%	JFK/ KJFK
7%	PVG
7%	PHX/ KPHX/ Phoenix
7%	DEN/ KDEN
6%	IAH/ KIAH
5%	BDL/ KBDL
5%	MCO/ KMCO
4%	HKG/ Hong Kong
4%	ICN
4%	SAT
4%	BFI
4%	MHT/ KMHT
4%	OAK/ KOAK
4%	SLC
3%	ORD
3%	DSM
2%	CAE/ KCAE
2%	MSP/ KMSP
2%	BOG
2%	TPE
2%	GUA
2%	MHR
2%	PDX/ KPDX
31%	Other (less than 1% mentioned)

Q32. From the following list of possible factors contributing to fatigue at UPS, please select the top five factors in your own mind with #1 being the factor that contributes the most, #2 being the next contributing factor, and so on until you have chosen your top five (5) factors. Remember you will only identify five (5) factors. If you feel some other factor that is not listed deserves to be considered, you may enter it next to the label "OTHER." [RANDOMIZE RESPONSES, EXCEPT "OTHER [SPECIFY]" AND UNSURE]

	RANK #1	RANK #2	RANK #3	RANK #4	RANK #5	NOT TOP5
Pairing construction	27%	20%	18%	11%	7%	17%
Line construction	12%	18%	14%	14%	11%	32%
Length of duty period	5%	9%	14%	14%	13%	45%
Number of legs during duty period	4%	9%	14%	14%	11%	48%
Added leg to schedule	0%	1%	1%	3%	3%	91%
Operational reschedules	1%	2%	2%	4%	7%	84%
24-hour layovers	10%	11%	8%	8%	7%	56%
Weather delays	0%	0%	1%	1%	1%	97%
Mechanical delays	0%	0%	1%	1%	1%	97%
Commuting	0%	0%	0%	1%	1%	97%
Hotel issues	0%	1%	2%	4%	6%	87%
Inadequate sleep rooms	0%	0%	1%	2%	3%	94%
Inadequate off-duty rest	1%	1%	2%	3%	4%	88%
Day-flying and night-flying (Circadian flip) in consecutive duty periods	16%	17%	14%	11%	10%	32%
Crew member mismanagement of off-duty time	0%	0%	1%	1%	2%	96%
Flying the back side of the clock	21%	21%	21%	21%	21%	44%
Other [SPECIFY]	2%	1%	1%	1%	3%	
TOTAL	100%	100%	100%	100%	100%	

Q33. During your career with UPS, have you ever called in fatigued?

40% Yes
59% No
1% Unsure

Q34. [IF Q33 = YES, n = 877] How many times within the past 12 months have you personally called in fatigued? [OPEN END NUMERIC RESPONSE]

71% 0
21% 1
6% 2
2% 3 or more

Q35. During your career with UPS, have you ever felt fatigued on duty but did not call in fatigued?

95%	Yes
3%	No
2%	Unsure

Q36. [IF Q35 = YES, n = 2,095] Being as specific as you can, why did you not call in fatigued when you felt fatigued on duty? [OPEN END]

23%	Fear of retribution/Punitive action by the company/Get suspended
17%	Calling fatigued brings scrutiny/questioning by management
16%	Due to multiple leg/Need to finish the flight scheduled
16%	It's hard to know you're fatigued until it's too late/end of the flight/after airborne
13%	It could cause harassment/pressured by the management/company
10%	It could cause loss of pay/sick bank penalty
8%	Not worth the hassle (i.e. paper works, report etc.)
7%	It is already part of the job/responsibility
6%	I can still manage to fly/thought I could make it
6%	It could cause scheduling problem
5%	Did not want to cause service failures
4%	Prefer calling if sick instead of fatigued
4%	Did not want my name highlighted in negative way/spotlight myself to the company as a trouble-maker
3%	Not having enough sleep/rest/Body clock flip-flops
2%	Backlash from the company
2%	I just mitigate fatigue
2%	Other crew/reserve crew members covered the trip
12%	Other [responses 1% or less]

Q37. [IF Q35 = UNSURE, n =44] Why did you say you were unsure about calling in fatigued when you may have felt fatigued on duty? [OPEN END]

25%	Just tired
25%	I was unsure/ Felt that I'm fine/could make it
20%	Didn't recognize it was fatigue
9%	It is part of the job/ Already expected
5%	Lack of sleep
5%	There's a thin line between tired and fatigued
20%	Other
7%	Don't Know/ Refused

Q38. If you have any additional comments about the fatigue issue that you feel were not addressed in this survey, you may enter them here. [OPEN END WITH OPTION OF "NONE/NOTHING" AS A PUNCH BENEATH THE OPEN-END VERBATIM BOX.]

15%	Scheduling delays/changes/rescheduling
13%	Line construction/purity/pairing construction
12%	No safety culture at UPS
8%	UPS more concerned about cost, profit or service
8%	UPS management does not care/no integrity/management structure
6%	Circadian rhythms
6%	Should provide more rest periods
5%	Sick calls/no one calls in fatigued/it is discourage
5%	Harassment/Retribution if sick time used or fatigue called/threaten discipline
5%	24-hour layovers
4%	Nature of backside of the clock flying
4%	Better FRMP(Fatigues Risk Management Plan)/Address fatigue concerns
3%	Cargo cut out/Part 117/Exclusion from new rules
3%	No sleep facilities at gateways/no adequate rest rooms
3%	Utilizing IROs on International flights
3%	Reserve Duty/reserve day-to-nights/reserve turnouts
3%	Hotel issues/hotels inadequate for rest/hotel noise interruptions
2%	B767 rest facilities are inadequate
2%	UPS culture punitive/fear
13%	Other [responses 1% or less]
36%	None/Nothing

Dr. Merrill M. Mitler - Biographical Sketch

I received a B.A. in Psychology from the University of Wisconsin, Madison, Wisconsin in 1967, and an M.A. in Child Psychology from Michigan State University, East Lansing, Michigan in 1968. I received a Ph.D. in Developmental Psychology from Michigan State University, East Lansing, Michigan in 1970. I also received a 3-year postdoctoral certificate in The Developmental Psychobiology of Sleep from Stanford University Medical School in Palo Alto, California in 1973. Upon completion of my training, I served on the teaching and research faculties of Stanford University from 1973 to 1978 and The State University of New York Stony Brook from 1978 to 1983. From 1983 to 2003, I was Professor in The Department of Neuropharmacology at The Scripps Research Institute and as a Psychologist at The Scripps Clinic in San Diego, CA. I also was Clinical Professor in The Department of Psychiatry at The University of California, San Diego. In my academic positions, I have had continuous funding in the form of fellowships and research grants awarded through competitive, peer-reviewed mechanisms by the National Institutes of Health from 1968 to 2002. These awards have allowed me to study various aspects of sleep physiology, sleep disorders, and the effects of sleep loss. I have published over 200 articles in scientific journals or books. I have been a frequent consultant to the U.S. Department of Transportation on matters related to fatigue and hours of service for commercial truck drivers. I was the sleep researcher responsible for the acquisition and processing of the DOT's 1996 study on driver fatigue and alertness, which, to date, is the world's largest objective study of fatigue in commercial truck drivers. From 2002 - 2013, I was Program Director at The National Institute of Neurological Disorders and Stroke, within The National Institutes of Health in Bethesda, Maryland. In 2010, I was detailed to NIH Director's Office, where I work on policy matters and administrative guidance related to the NIH Extramural Program.

From 1983 to the present, I have maintained a private practice in forensic examination confined to sleep, fatigue and neuropharmacology as they pertain to transportation and industrial mishaps and associated litigation. In the role of a private practitioner, I render opinions and testify. My forensic examinations are independent of, and unrelated to, the university and/or government positions I have held. I am frequently asked to examine documents and render opinions as well as to provide scientific information and expert testimony concerning the following topics:

- physiology of sleep
- circadian rhythms
- effects of trying to sleep during the daytime on alertness and sleep quality
- effects of working irregular hours on alertness and sleep quality
- effects of sleeping in a sleeper berth on alertness and sleep quality
- the phenomenon of cumulative fatigue after obtaining inadequate sleep over several 24-hour days
- effects of fatigue on driving performance
- effects of sleep disorders on driving performance
- driver behavior and appearance before and immediately after a fatigue-related driving error
- effects of medications and drugs of abuse on sleep, wakefulness and performance
- fatigue management programs for industries that operate around the clock

The opinions I express are based upon a reasonable degree of scientific certainty, my professional knowledge, training, and research experience in the area of sleep physiology, as well as the documents and materials provided to me for examination.

CURRICULUM VITAE of Merrill M. Mitler, Ph.D.

(Current as of March 3, 2014)

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Bethesda, MD 20814

CURRENT POSITION:

1983 –	Private Practice, Forensic Examination

EDUCATION:

B.A.	1967	University of Wisconsin, Madison, Wisconsin [Political Science and Psychology].
M.A.	1968	Michigan State University, East Lansing, Michigan [Child and Developmental Psychology].
Ph.D.	1970	Michigan State University, East Lansing, Michigan [Developmental and Physiological Psychology].

ADDITIONAL TRAINING:

1970 – 1973	Postdoctoral Training - Developmental Psychobiology of Sleep, Department of Psychiatry, Stanford University, Stanford, California.
1976 – 1977	Training in Sleep Medicine (Clinical Polysomnography), Department of Psychiatry, Stanford University, Stanford, California.
1989	Miramar College - San Diego Law Enforcement Training Center (Traffic Accident Investigation and Skid Mark Analysis), San Diego, California

POSITIONS HELD:

1972 – 1978	Lecturer, Department of Psychology, Stanford University.
1973 – 1977	Research Associate and Associate Director of the Stanford University Sleep Research Center, Stanford University School of Medicine.
1977 – 1978	Administrative Director, Sleep Disorders Program, Stanford University School of Medicine.
1978 – 1981	Research Scientist 7, Long Island Research Institute, Office of Mental Health, State of New York.
1978 – 1982	Research Associate Professor of Psychiatry (Psychology) Department of Psychiatry and Behavioral Science, School of Medicine, State University of New York at Stony Brook.
1981 – 1983	Research Scientist 8, Long Island Research Institute, Office of Mental Health, State of New York.
1982 – 1983	Research Professor of Psychiatry (Psychology), Department of Psychiatry School of Medicine, State University of New York at Stony Brook.
1983 – 1988	Senior Staff Scientist, Research Institute of Scripps Clinic.
1983 – 2001	Member, Scripps Clinic Medical Group.
1983 – 2002	President, Wakefulness-Sleep Education and Research Foundation, Inc.
1983 – 2003	Professor, Department of Neuropharmacology The Scripps Research Institute, La Jolla, CA
1983 – 2004	Clinical Professor, Department of Psychiatry and Behavioral Science The University of California, San Diego
2004 – 2007	Administrative Team Leader, Systems and Cognitive Neuroscience Cluster The National Institute of Neurological Disorders and Stroke National Institutes of Health
2010 – 2012	Chairman, Program Leadership Committee National Institutes of Health
2012 – 2013	Scientific Team Leader, Systems and Cognitive Neuroscience Cluster

	The National Institute of Neurological Disorders and Stroke National Institutes of Health
2002 – 2013	Program Director, Homeostatic Mechanisms The National Institute of Neurological Disorders and Stroke National Institutes of Health
2010 – 2013	Detailee, NIH Director's Office, Office of Extramural Programs

LICENSES AND BOARD EXAMINATIONS:

1982	New York State Psychology (License Number 007055).
1983	California State Psychology (License Number PA 7767).
1991	American Board of Sleep Medicine (Certificate Number 013).
1994	American Board of Forensic Examiners (Identification Number 107).
1996	American Board of Forensic Medicine (Identification Number 828).

AWARDS/HONORS:

1963	Scholarship to the University of Wisconsin awarded to upper one percent of high school graduates in the state.
1967	Graduated with Honors from the University of Wisconsin.
1969	Awarded 2 year N.I.H. Predoctoral Fellowship.
1970	Awarded 3 year N.I.H. Postdoctoral Fellowship.
1975	Listed in Who's Who in the West.
1979	Listed in Who's Who in the East.
1984	Nathaniel Kleitman Prize for Distinguished Service.
1991	Listed in Who's Who of Emerging Leaders in America.
1994	Listed in Dictionary of International Biography - Twenty-Third Edition.
2000	Listed in National Register's Who's Who In Executives and Professionals.

APPOINTMENTS AND COMMITTEES:

1974	Elected to the Executive Board of the Association for the Psychophysiological Study of Sleep.
1975	Publications Chairman for the Association for the Psychophysiological Study of Sleep and Co-editor of Sleep Research, 1976 - 1979.
1975	Editorial Board of *Sleep Reviews.*
1978	Executive Secretary-Treasurer - Association of Sleep Disorders Centers.
1978	Consulting Editor, *Sleep.*
1979	Medical Consultant to the American Narcolepsy Association.
1980	Consulting Editor, *Psychophysiology.*
1981	Advisory Board, The Center for Design of Industrial Schedules.
1982	Advisory Board, *American Health Magazine.*
1984	Chairman, Committee for Insurance and Governmental Relations - Association of Sleep Disorders Centers.
1985	Board of Directors - American Narcolepsy Association.
1985	Board of Governors - Association of Professional Sleep Societies.
1992	Member ADAMHA - Reviewers Reserve.
1992	National Task Force on the NIH Strategic Plan.
1993	Member NIH - Reviewers Reserve.
1993	Governmental Affairs Committee - American Sleep Disorders Association.
1995	Member U. S. Department of Transportation Truck and Bus Safety Summit.
1995	Member, Human Factors Advisory Committee of the Commercial Vehicle Safety Alliance.
1998	Member, Expert Panel on Review of FHWA Proposals on Hours of Service Regulations
1999	Executive Secretary-Treasurer - Sleep Research Society.
2000	Member, Review and Site Visit Team of Fundação Amparo a Pesquisa do Estado de Sao Paulo, Brazil (FAPESP) for finalists of the Centers of Excellence for Research, Innovation and Diffusion (CEPID) program.
2003	NIH Sleep Disorders Research Advisory Board

2004 NIH Task Force on Obesity Research

MEMBERSHIPS:
Sleep Research Society (inactive)
American Academy of Sleep Medicine (inactive)

PUBLICATIONS (Selected citations contain an internet link to the entire document):
BOOKS AND REPORTS:

1. Chase, M.H., Mitler M.M. and Walter, P.L. (eds.) *Sleep Research,* volume 5, Brain Information Service/Brain Research Institute, University of California, Los Angeles, 1976.
2. Chase, M.H., Mitler M.M. and Walter, P.L. (eds.) *Sleep Research,* volume 6, Brain Information Service/Brain Research Institute, University of California, Los Angeles, 1977.
3. Chase, M.H., Mitler M.M. and Walter, P.L. (eds.) *Sleep Research,* volume 7, Brain Information Service/Brain Research Institute, University of California, Los Angeles, 1978.
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5. Anch, A.M., Browman, C.P., Mitler, M.M. and Walsh, J.K. *Sleep: A Scientific Perspective,* Englewood Cliffs: Prentice-Hall, 1988.
6. Mitler, E.A. and Mitler M.M. *101 Questions About Sleep and Dreams, Second Edition,* Del Mar, California: Wakefulness-Sleep Education and Research Foundation, 1988.
7. Mitler, E.A. and Mitler M.M. *101 Questions About Sleep and Dreams, Third Edition,* Del Mar, California: Wakefulness-Sleep Education and Research Foundation, 1990.
8. Mitler, E.A. and Mitler M.M. *Der Traum vom guten Schlaf 101 Fragen und Antworten zum Thema Schlaf und Träume,* R. Lund (translator), München: Arcis Verlag, 1992.
9. Mitler, E.A. and Mitler M.M. *101 Questions About Sleep and Dreams, Fourth Edition,* Del Mar, California: Wakefulness-Sleep Education and Research Foundation, 1993.
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11. Mitler, E.A. and Mitler M.M. *101 Questions About Sleep and Dreams, Fifth Edition,* Del Mar, California: Wakefulness-Sleep Education and Research Foundation, 1995.
12. Wylie D., Miller J.C., Shultz T., Mitler M.M., Mackie R.R. Technical Report: Commercial Driver Fatigue, Loss of Alertness, and Countermeasures, Washington, DC: U.S. Department of Transportation, FHWA-MC-97-001, 1996.
13. Mitler E.A. and Mitler M.M. Een Sleep om van te Dromen: 101 Vragen over slapen en Dromen, R. Cluydts and J. De Roeck (translators), Nederlandstalige bewerking: W.V.S.S, vzw, 1998.
14. Poceta, JS, Mitler MM, (Eds.) Sleep Disorders: Diagnosis and treatment, Totowa, NJ: Humana Press, 1998.
15. Belenky, G., McKnight, A.J., Mitler, M.M., Smiley, Al. Tijerina, L. Waller, P.F., Wierwille, W.W., Willis, D. Hours-of-Service Regulations for Commercial Drivers, Report of the Expert Panel on Review of FHWA Proposals on Hours of Service Regulations, Washington, DC: U.S. Department of Transportation, FHWA-2350-618, September 10, 1998.
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18. McCallum, M., Sanquist, T., Mitler, M., and Krueger, G., Commercial Transportation Operator Fatigue Reference, U.S. Department of Transportation, Human Factors Coordinating Committee, July, 2003, Work Performed Under Other Transaction Agreement No. DTRS56-01-T-003.

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1. Mitler, M.M. and Harris, L. Dimension preference and performance on a series of concept identification tasks in kindergarten, first-grade and third-grade children. *Journal of Experimental Child Psychology*, 1969, *7*, 374-384.
2. Harris, L., Schaller, M.J. and Mitler, M.M. The effects of stimulus type on performance in a color-form sorting task with preschool, kindergarten, first-grade and third-grade children. *Child Development*, 1970, *41*, 177-191.

3. Mitler, M.M. and Levine, R. Sleep analysis and a simple technique for selective deprivation of low-voltage, fast-wave sleep in a species of deermouse, *P. m. bairdi*. *Psychophysiology,* 1970, *7,* 112-120.
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UPS Pilot Safety Survey Results

March 2014

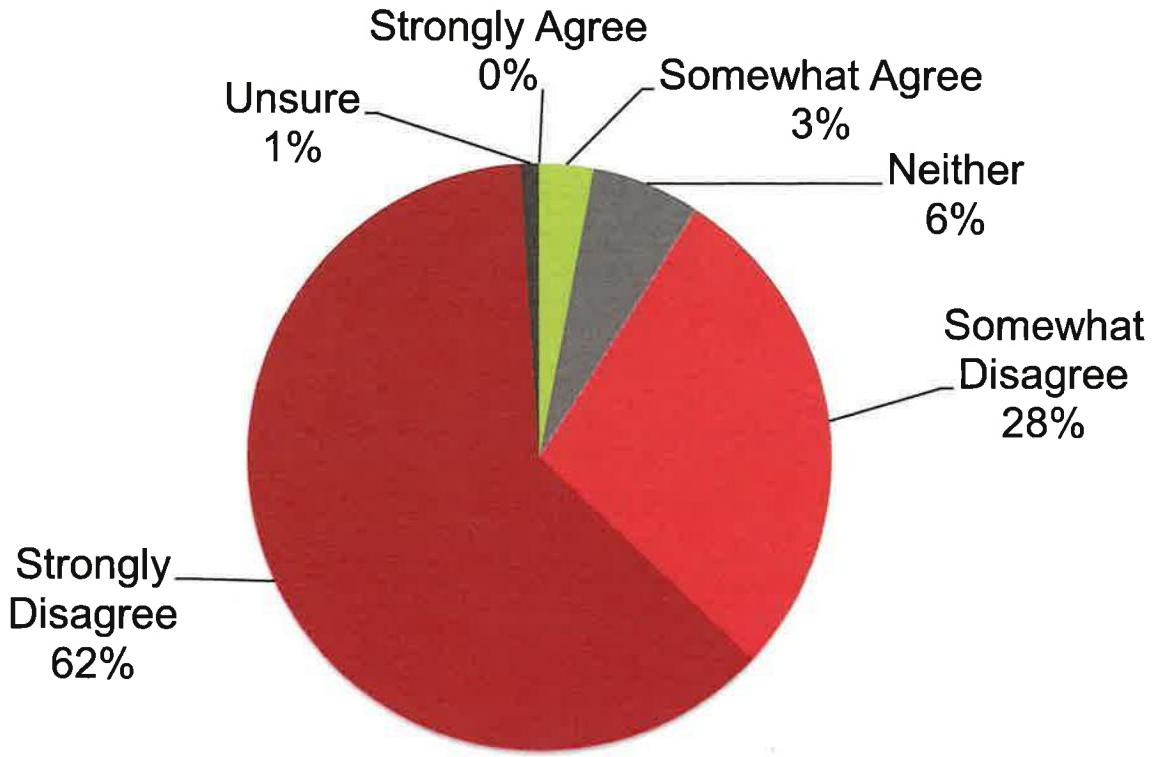
UPS Pilot Safety Survey

- Survey conducted by IPA at request of the NTSB
- Request issued by NTSB during its UPS Flight 1354 accident investigation

Survey Response

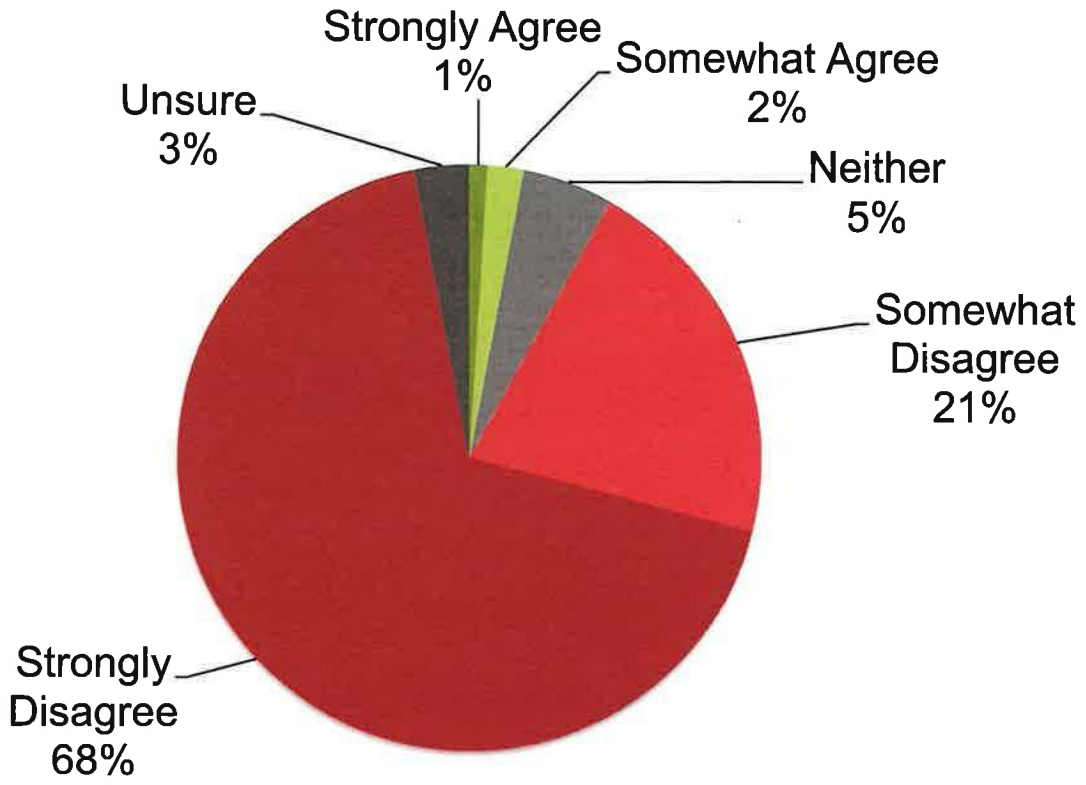
- **2,202 UPS Pilots responded to survey request**
- 93% Response Rate
- Margin of Error: +/- 0.57%
- Confidence Interval: 95%

Question 3. UPS manages fatigue threats, and prevents and mitigates fatigue risk in order to ensure safe flight operations.



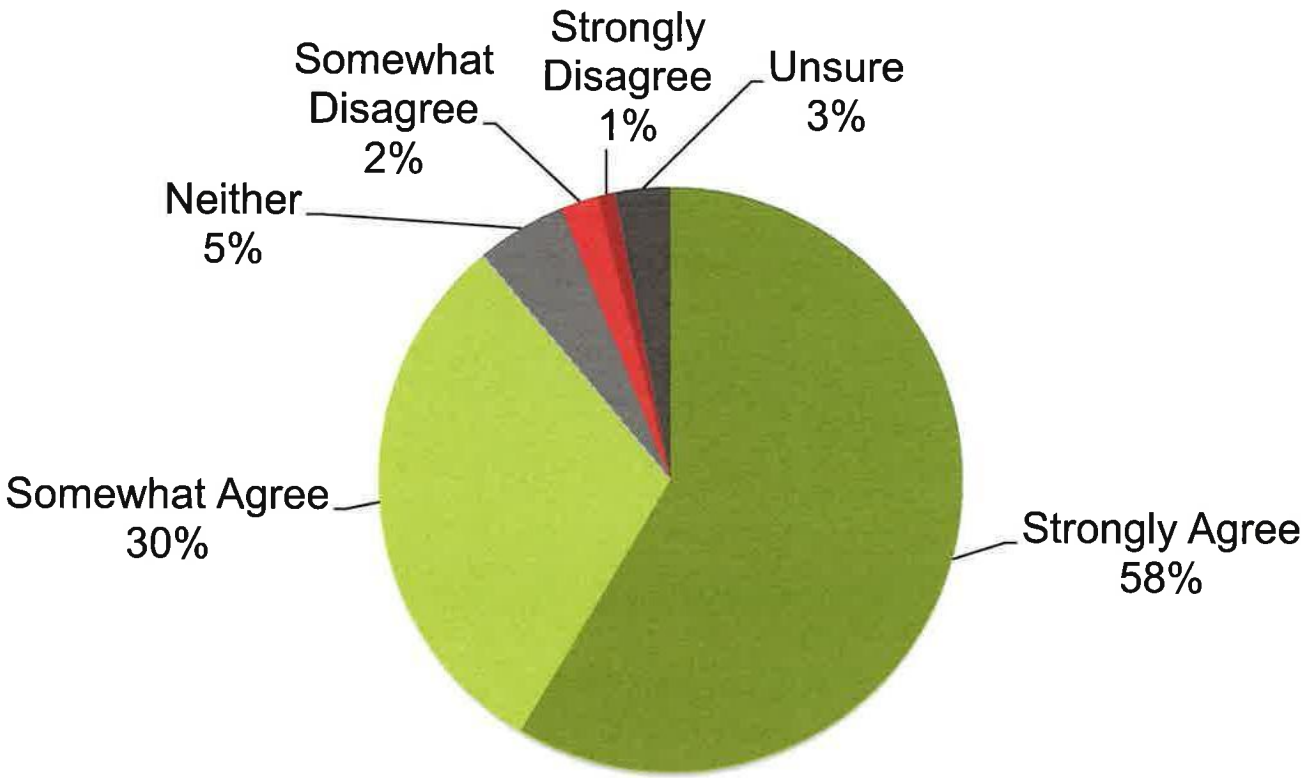
90% of Respondents disagree (62% - strongly, 28% - somewhat)

Question 5. UPS mitigates fatigue risk when trends or threats associated with schedules, pairings, or trips are identified to them.



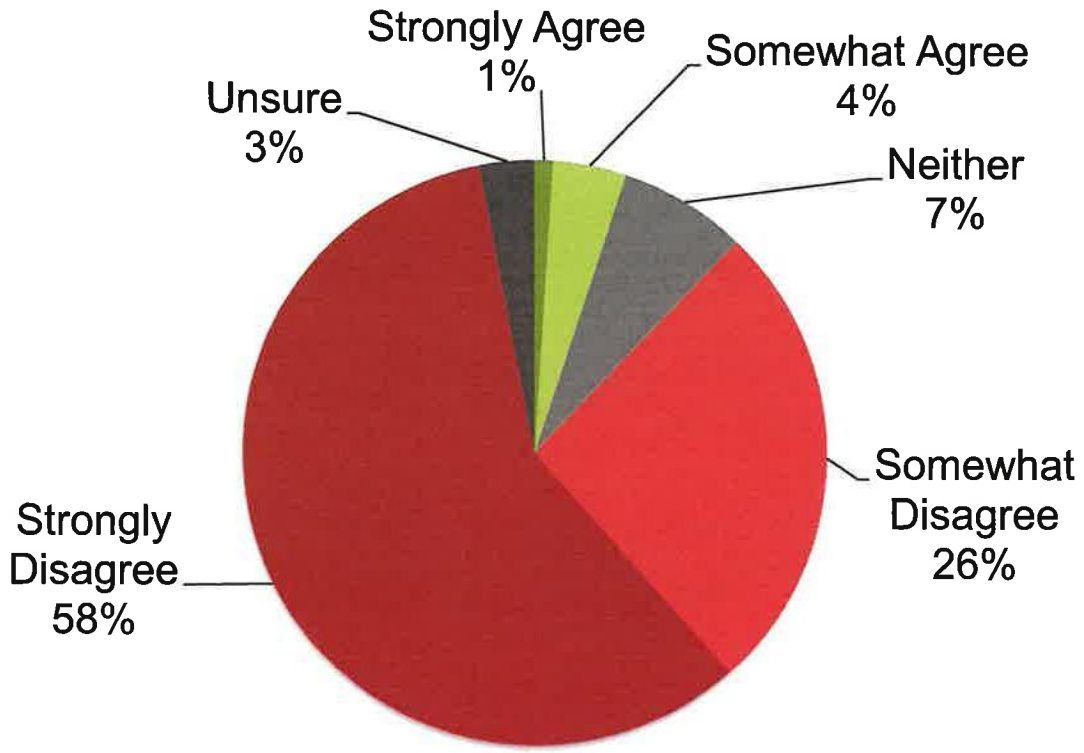
89% of Respondents disagree (68% - strongly, 21% - somewhat)

Question 19. Calling in fatigued will invite adverse scrutiny from UPS.



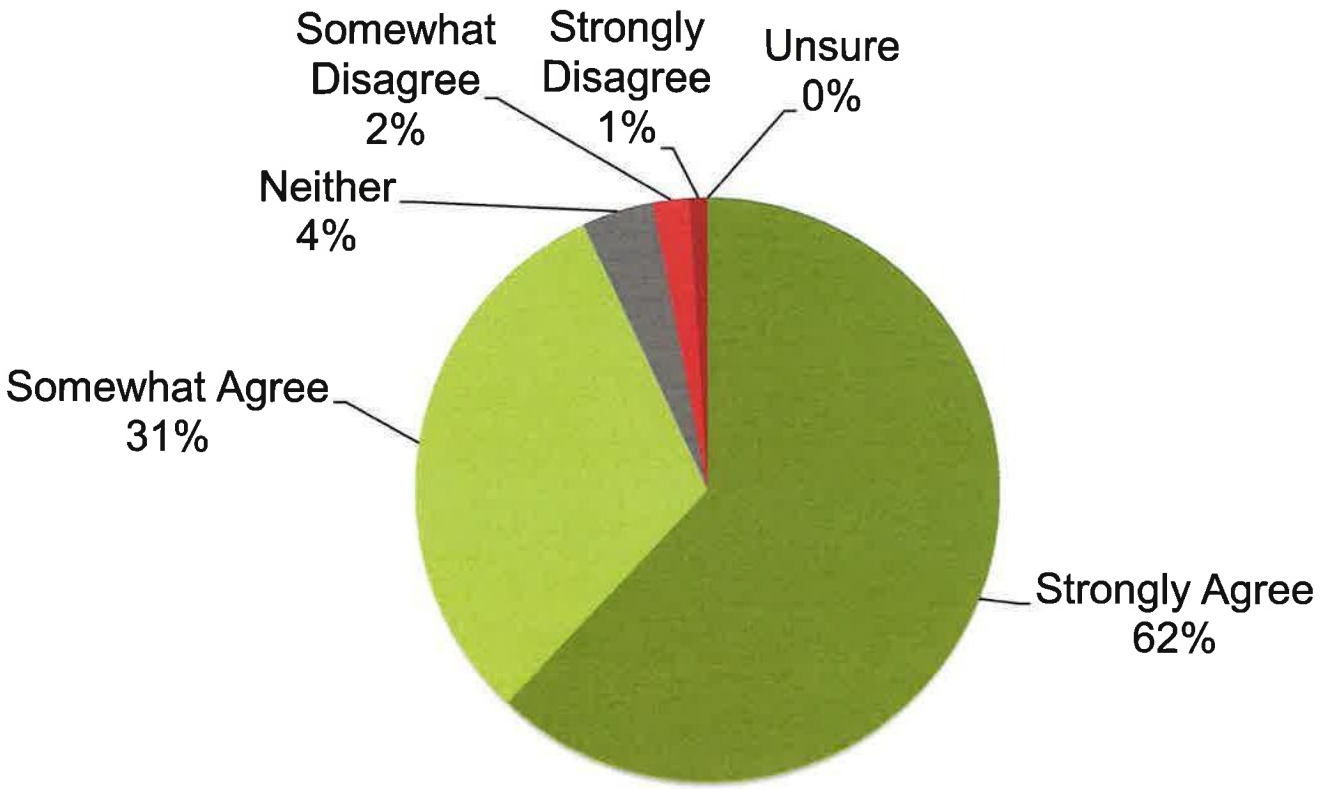
88% of Respondents agree (58% - strongly, 30% - somewhat)

Question 6. UPS encourages crewmembers, in a non-punitive manner, to report fatigue risk that they encounter or see.



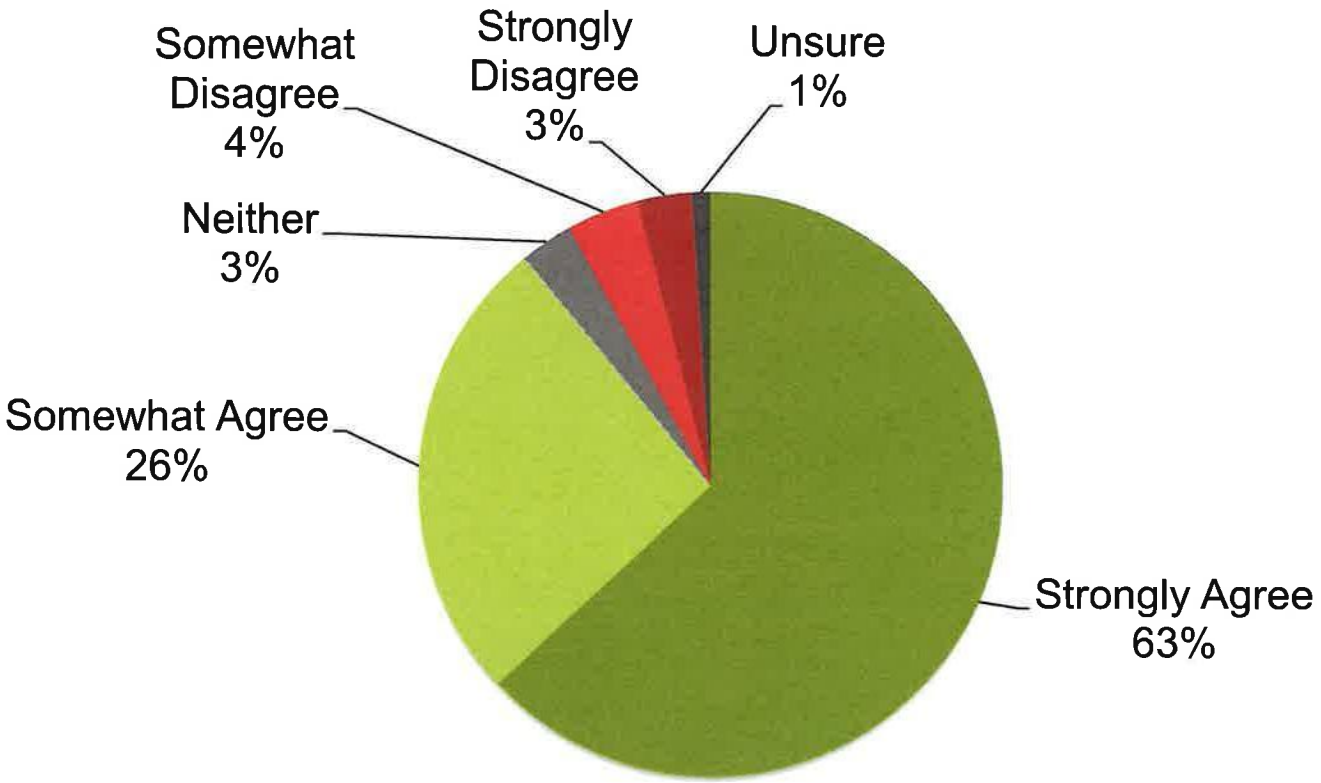
84% of Respondents disagree (58% - strongly, 26% - somewhat)

Question 18. It is not uncommon to fly with another crew member who exhibits signs of fatigue.



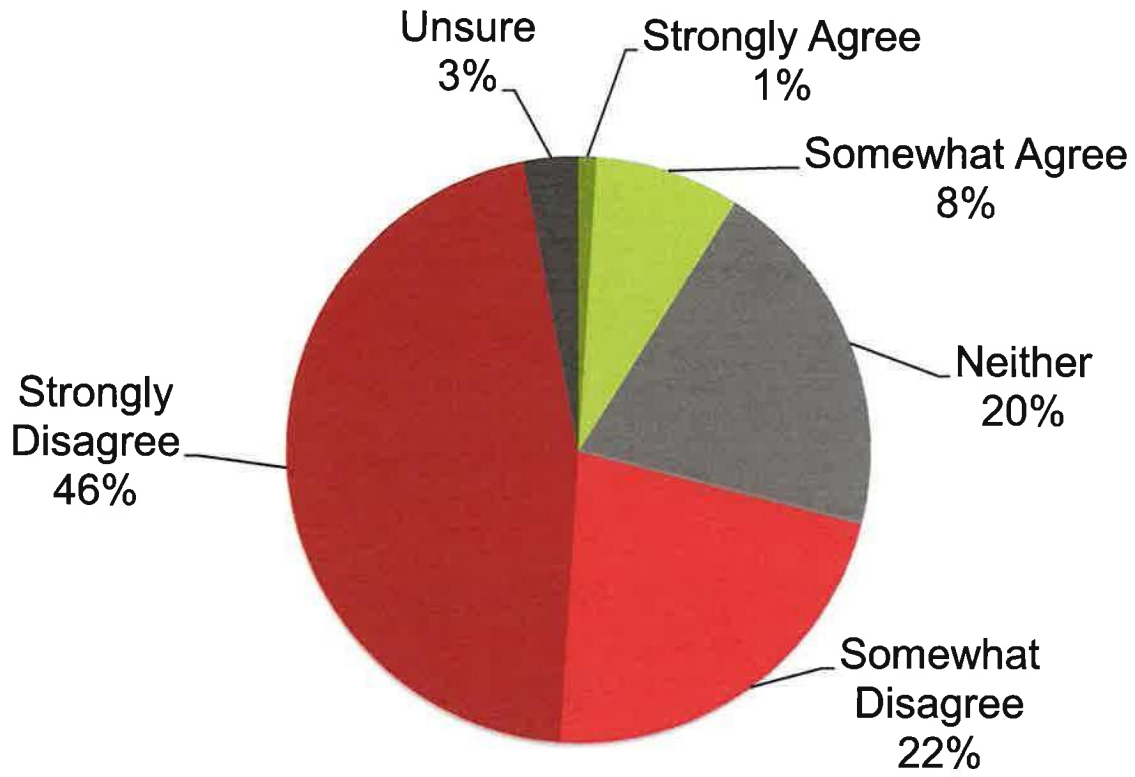
93% of Respondents agree (62% - strongly, 31% - somewhat)

Question 7. Fatigue prevention and mitigating the effects of fatigue are joint responsibilities of UPS and IPA crew members.



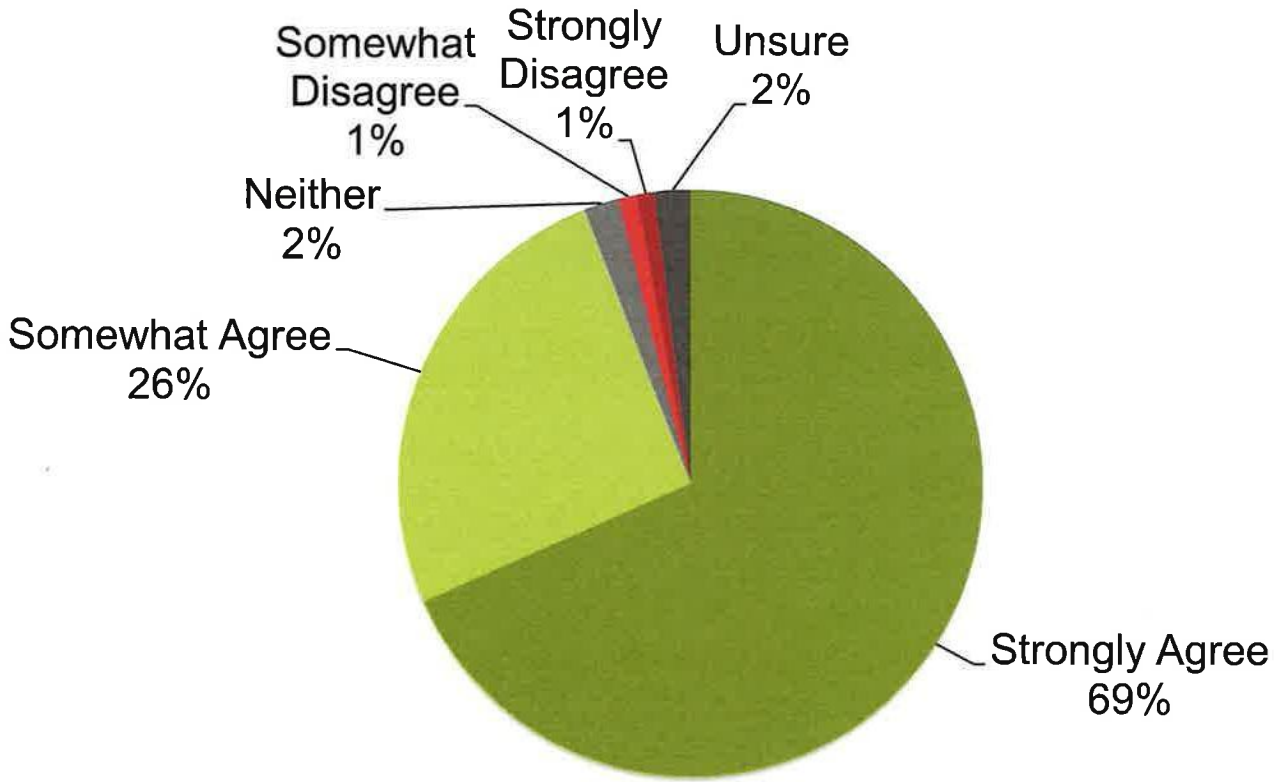
89% of Respondents agree (63% - strongly, 26% - somewhat)

Question 9. The UPS Fatigue Risk Management Plan (FRMP) and training have helped me to recognize the threats of fatigue in myself and co-workers.



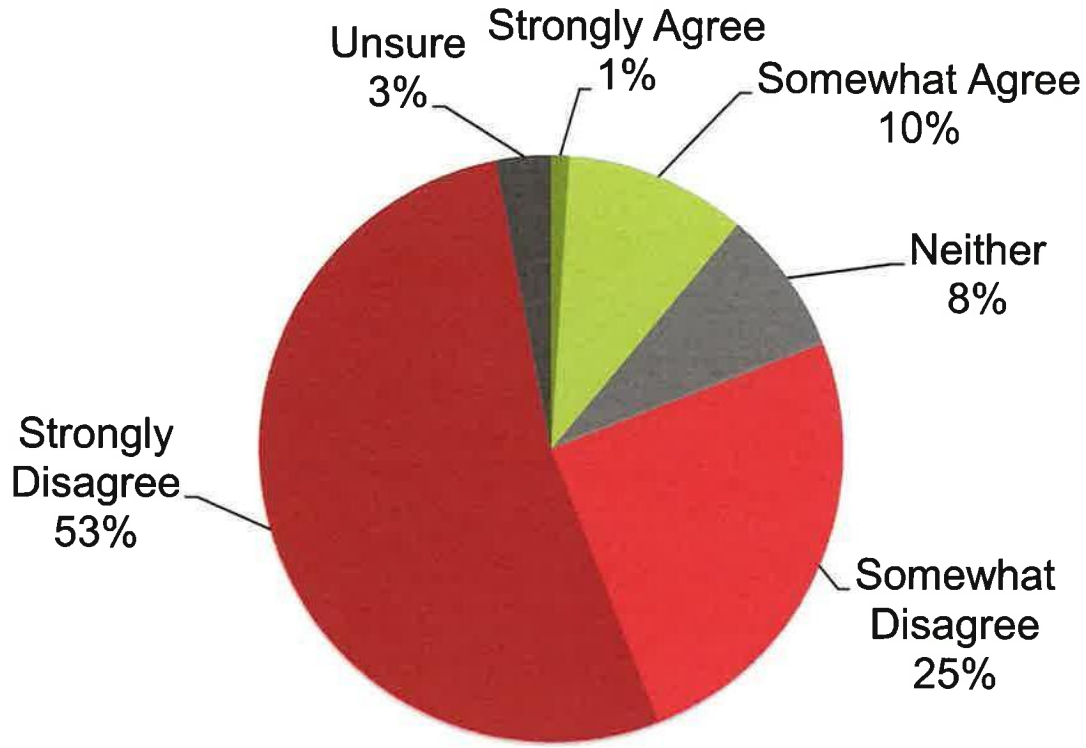
68% of Respondents disagree (46% - strongly, 22% - somewhat)

Question 24. Schedules would improve, from a fatigue/safety standpoint, if there were an effective IPA and UPS partnership in creating the pairings and lines.



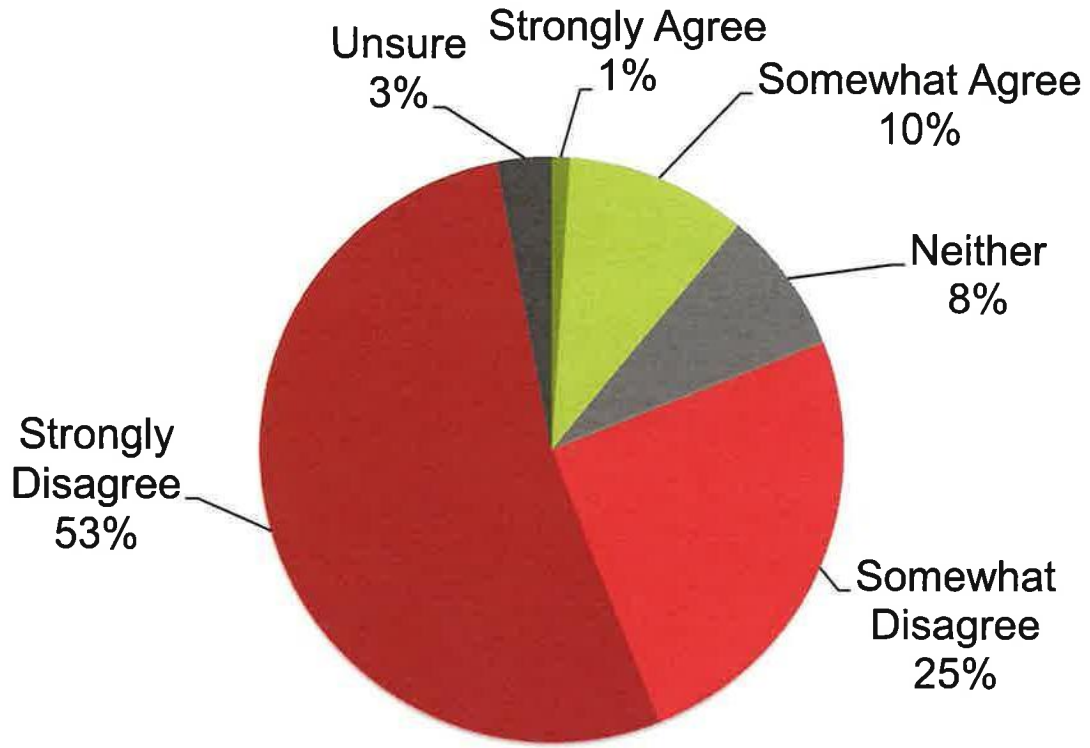
95% of Respondents agree (69% - strongly, 26% - somewhat)

Question 29. Adequate sleep rooms are available for crew members throughout the UPS system.



78% of Respondents disagree (53% - strongly, 25% - somewhat)

Question 29. Adequate sleep rooms are available for crew members throughout the UPS system.

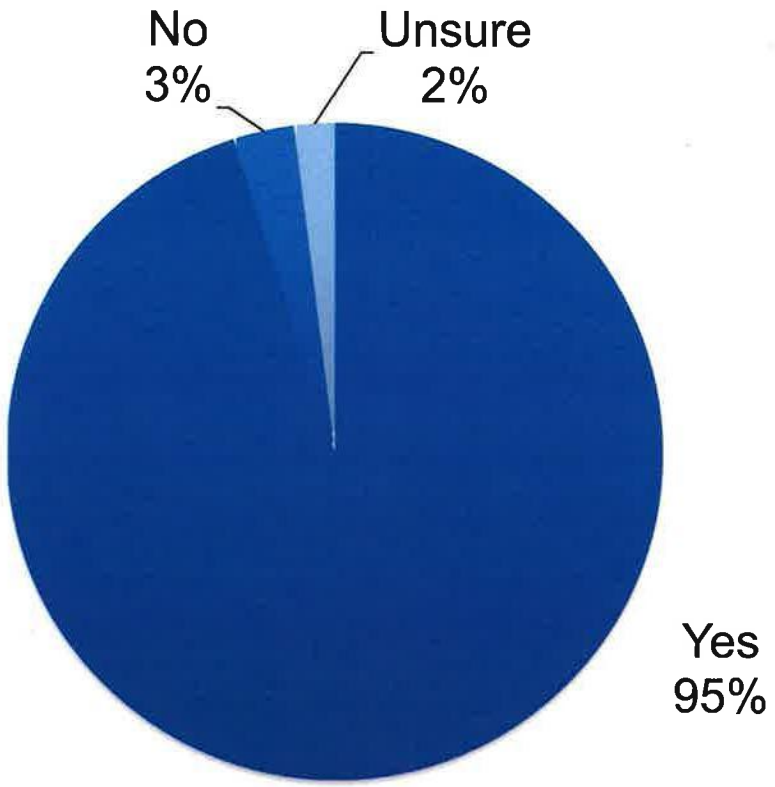


78% of Respondents disagree (53% - strongly, 25% - somewhat)

Fatigue Causes Cited

- With respect to perceived causes of fatigue, inspection of results (Question 32) indicates that the following factors are most commonly cited as the #1 cause of fatigue:
  - Pairing/trip construction
  - Flying the back side of the clock
  - Day-flying and night-flying (Circadian flip) in consecutive duty periods
  - Line construction (a line = all pairings within a pay period)
  - 24-hour layovers

Question 35. During your career with UPS, have you ever felt fatigued on duty but did not call in fatigued?



When asked why these Respondents did not call in fatigued when they felt fatigued on duty, the most common reasons cited were:

- **Fear of retribution/punitive action/ get suspended**
- **Did not want my name highlighted in any way/spotlight myself to the company as a trouble maker**

UPS Pilot Safety Survey
Conclusions

1. UPS pilots do not believe their Company is dedicated to a collaborative safety program which includes the mitigation of fatigue
2. UPS pilots believe fatigue threats are pervasive in UPS flight schedules
3. UPS pilots know they have a joint responsibility to properly manage their fatigue risks
4. A large majority of pilots believe UPS will pursue punitive action if they report a fatigued condition before a flight assignment

Questions?

Fatigue Risk Management

Pilots do not believe UPS is committed to reducing air crew fatigue

93% of pilots do not believe UPS provides adequate Boeing 767 crew rest facilities when additional pilots are required by the FAA for long-range flights

90% of pilots do not believe that UPS manages fatigue threats and prevents and mitigates fatigue risk in order to ensure safe flight operations

89% of pilots disagree with the statement that UPS mitigates fatigue risk when trends or threats associated with flight assignments are identified to them

83% of pilots believe UPS values on-time delivery service over safety

78% of pilots do not believe that UPS provides adequate rest facilities during lengthy en route stops

Pilot Schedules

Pilots believe fatigue threats are pervasive in UPS flight assignments

95% of pilots believe UPS does not effectively address fatigue in air crew schedules, rescheduling, rest, duty limitations, and reserve pilot utilization

93% of pilots agree that it is not uncommon to fly with another crewmember who exhibits signs of fatigue

Pilot Responsibility

UPS pilots believe they also have the responsibility to properly manage their fatigue risks

91% of pilots say they are effective in managing fatigue issues within their control

89% of pilots believe fatigue prevention and mitigation are joint responsibilities of UPS and individual pilots

Pilot Fatigue Calls

A large majority of pilots believe UPS will take punitive action if they report excessively fatigued for a flight assignment

88% of pilots believe that calling in fatigued will invite adverse scrutiny from UPS

84% of pilots disagree with the statement that UPS encourages crewmembers, in a non-punitive manner, to report fatigue risk that they encounter or see

81% of pilots do not believe that UPS honors a pilot's self-assessment and self-removal from duty because of fatigue, without coercion, retribution, or punitive action

Top 5 Major Fatigue Factors

#1 UPS Pilot Scheduling

#2 Backside of the Clock Flying

#3 Day Shift, Night Shift Flip

#4 24 Hour Rest Periods

#5 Length of Time on Duty

Reference 4

4. NTSB Accident Reports:

    a. Runway Overrun During Landing, American Airlines Flight 1420, McDonnell Douglas MD-82, N215AA, Little Rock, Arkansas, June 1, 1999, NTSB/AAR-01/02

    b. Collision with Trees on Final Approach, Federal Express Flight 1478, N497FE, Tallahassee, Florida, July 26, 2002, NTSB/AAR-04/02

    c. Crash During Approach to Landing, Empire Airlines (FedEx) Flight 8284, Avions de Transport Régional, Aerospatiale Alenia ATR 42-320, N902FX, Lubbock, Texas, January 27, 2009, NTSB/AAR-11-02

    d. Loss of Control on Approach Colgan Air, Inc. Operating as Continental Connection Flight 3407 Bombardier DHC-8-400, N200WQ Clarence Center, New York February 12, 2009, NTSB/AAR-10/01, PB2010-910401

Reference 5

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, PB94-910406, NTSB/AAR-94/04

Reference 6

National Transportation Safety Board, Aircraft Accident Report: Collision with Trees and Crash Short of Runway, Corporate Airlines Flight 5966, British Aerospace BAE-J3201, N875JX, Kirksville, Missouri, October 19, 2004. NTSB/AAR-06-01.

Reference 7

National Transportation Safety Board, Aircraft Accident Report: Runway Overrun During Landing Shuttle America, Inc. Doing Business as Delta Connection Flight 6448 Embraer ERJ-170, N862RW Cleveland, Ohio February 18, 2007. NTSB/AAR-08-01

Reference 8

National Transportation Safety Board, Aircraft Accident Report: Runway Overrun During Landing Pinnacle Airlines Flight 4712 Bombardier/Canadair Regional Jet CL600-2B19, N8905F Traverse City, Michigan April 12, 2007, NTSB/AAR-08-02.

Reference 9

Levin,Alan. "Pilot-Fatigue Rules Unchanged at FedEx, UPS After U.S. Meeting." *Bloomberg.com*. Bloomberg L.P. 1 March 2012. Web. 30 April 2014

(See below)

Pilot-Fatigue Rules Unchanged at FedEx, UPS After U.S. Meeting

By Alan Levin Mar 1, 2012 6:11 PM ET (Bloomberg News)

FedEx Corp. (FDX) and United Parcel Service Inc. (UPS) said U.S. regulators failed to persuade the two cargo airlines to adopt pilot-fatigue rules imposed on passenger carriers.

“The reality is that one size does not fit all when it comes to maintaining pilot alertness,” Maury Donahue, a spokeswoman for FedEx, said in an e-mail. “Flight scheduling at a cargo airline is very different from passenger carriers.”

Representatives from Memphis, Tennessee-based FedEx and UPS were among cargo executives who met today in Washington with Transportation Secretary Ray LaHood and Federal Aviation Administration Acting Chief Michael Huerta. After announcing in December that cargo operators would be exempt from new anti-fatigue measures for passenger carriers, LaHood said he would ask them to voluntarily adopt the new standards.

LaHood and Huerta “had a productive meeting today with our cargo partners and look forward to working together to ensure the safety of our national air transportation system,” Justin Nisly, a Transportation Department spokesman, said in a statement.

Kara Gerhardt Ross, a spokeswoman for Atlanta-based UPS, said the company currently operates under “a much higher standard” for fatigue prevention and doesn’t need to adopt the new rules. The airline is committed to working with the FAA to achieve “the best practices for fatigue mitigation,” she said in a phone interview. The company has opposed applying pilot-fatigue rules to its operations.

Cargo airlines, which operate more flights at night than passenger carriers, have argued that altering pilot schedules would be too costly and are unnecessary.

Under the rules, set to take effect in December 2013, passenger pilots would get longer rest periods between shifts and have their work hours curtailed during overnight flights or after crossing multiple time zones.

Reference 10

Group Chairman's Factual Report – Operational Factors, Docket SA-538, 550741, p60-65

(See below)

Group Chairman's Factual Report - Operational Factors
Docket SA-538, 550741, pages 60-65

14.5.2 Sequencing the Approach

FMC downloaded data indicated that UPS1354 was navigating direct to KBHM when, at 0442, ATC told UPS1354 to "turn ten degrees right, join the localizer, maintain three thousand." This clearance took the flight off its NAV routing direct to KBHM. According to the UPS A300 PTG, once vectored off of the FMC lateral track, A300 pilots will re-sequence the FMC to reflect the anticipated approach waypoints to be flown. Pilots were guided to use an "H.O.V.E" check to properly sequence an approach in the FMC.[136] The UPS A300 PTG, Section 02.01.07.02 "Initial Approach" stated the following, in part:

> *Proper management of the AFDS significantly enhances the efficiency of the crew when flying any approach. A good "rule-of-thumb" to remember is the "H.O.V.E." check.*
>
> *(H) = HDG/S. HDG/S - mode must be used when being radar vectored in the terminal area to comply with ATC instructions.*
> *(O) = Out of Profile - Once vectored off of the FMC lateral track, PROFILE mode is inaccurate and of little use. Therefore, to comply with ATC altitude instructions, the use of LVL/CH or V/S modes the crew direct control over the vertical path of the aircraft.*
> *(V) = V/N/I switch - Select the V/N/I switch to the appropriate mode for the approach being flown.*

[133] Source: A300 CQ Homestudy 2013.
[134] One dot on the VDI equaled 100 feet.
[135] Source: UPS A300 AOM, Section 04.06.01.06.
[136] The H.O.V.E check was found in the UPS A300 PTG Normal Procedures. According UPS A300 instructors and check airmen, the "H.O.V.E." check was to be utilized by A300 flight crews on all normal approaches (precision and non-precision). The check was not unique to non-precision approaches only.

(E) = Extend the Centerline - The Pilot Flying should ask the PM to load the expected approach (or runway if accomplishing a visual approach) and extend the centerline. Once the approach has been properly loaded and verified in the FMC, the F-PLN page should reflect the correct sequence of waypoints and altitudes to be flown on the approach.

During the December 4, 2013 simulator testing in KSDF, representatives of the Operations Group inserted the KBHM LOC 18 approach into the FMC, and applied the "H.O.V.E." check to re-sequence the LOC 18 approach in the FMC. Following the re-sequencing of the approach, the F-PLN DISCONTINUITY was no longer viewed in the active flight plan on the CDU (see photo 8), and the previous navigation path that showed a direct routing to KBHM on the ND was removed (see photo 9).

Photo 8: CDU with re-sequenced flight plan for KBHM LOC18.[137]

[137] Photo taken by Ops Group Chairman on December 4, 2013 in a UPS A300 simulator.

Photo 9: PFD and ND with re-sequenced flight plan.[138]

According to downloaded FMC data from the accident airplane, the flight plan for UPS1354 was not re-sequenced prior to executing the KBHM LOC18 approach, and the flight plan discontinuity remained in the flight plan (see photos 10 through 12, taken during the December 4, 2013 simulator testing in KSDF of the PFD/ND and CDU when the KBHM LOC18 approach was not sequenced).[139]

[138] Photo taken by Ops Group Chairman on December 4, 2013 in a UPS A300 simulator.
[139] For additional information, see Systems Group Chairman's Factual Report.

Photo 10: PFD/ND with approach not sequenced.[140]

[140] Photo taken by Ops Group Chairman on December 4, 2013 in a UPS A300 simulator.

Photo 11: CDU F-PLN page with approach not sequenced.[141]

[141] Photo taken by Ops Group Chairman on December 4, 2013 in a UPS A300 simulator.

Photo 12: CDU FINAL APP page with the approach not re-sequenced.[142]