Docket No. SA-538

Exhibit No. 14-A

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Human Performance Group Chairman's Factual Report

(30 pages)

(4 pictures)

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

January 31, 2014

Group Chairman's Factual Report

HUMAN PERFORMANCE

DCA13MA133

A. ACCIDENT

Operator:	United Parcel Service (UPS)
Location:	Birmingham, Alabama
Date:	August 14, 2013
Time:	0447 central daylight time (cdt)[1]
Airplane:	Airbus A300-600
Registration:	N155UP

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[1] All times are based on a 24-hour clock. Time of the accident is approximate.

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C. SUMMARY

On August, 14, 2013, about 0447 central daylight time (CDT)[2], United Parcel Service (UPS) flight 1354, an Airbus A300-600, N155UP, crashed short of runway 18 while on approach to Birmingham-Shuttlesworth International Airport (BHM), Birmingham, Alabama. The two flight crew members were fatally injured and the airplane was destroyed. The cargo flight was operating under 14 Code of Federal Regulations (CFR) Part 121 and originated from Louisville International-Standiford Field Airport (SDF), Louisville, Kentucky.

D. DETAILS OF THE INVESTIGATION

Operations/Human Performance Group activities are outlined in the Operational Factors Group Chairman's Factual Report. The Human Performance Group Chairman's Factual Report contains additional documentation relevant to flightcrew pre-accident activities and health; company policies regarding fitness for duty, crew resource management, and fatigue; company training; and FAA guidance on flight and duty time limits and training.

E. FACTUAL INFORMATION

1.0. Flight Crew Information

The flight crew information was documented through interviews, company records, hotel records, and personal electronic device (PED) records.[3]

[2] All times listed are cdt unless otherwise noted.
[3] For more information, see attachment 1 to this report, attachments 1-3 to the Operational Factors Group Chairman's Factual Report, and the Mobile Devices Specialist's Factual Report.

1.1. The Pilot Flying (PF)

The pilot flying (PF), age 58, was based at SDF, and lived in Charlotte, North Carolina, with his wife and teenage daughter. His wife said he had no major changes, good or bad, to his financial situation, or personal life that would have impacted his performance on the day of the accident; and he did not have any concerns about working for UPS, flying the A300 or his schedules becoming more demanding.

One pilot who flew with the PF reported he was average to above average and said that the PF managed the cockpit better than most and took input from the first officer during his briefings. No pilots expressed concerns about flying with the PF. Another pilot sated the PF was "very normal and standard," was very routine, and did nothing out of the ordinary. The PF followed all the procedures, had good briefings and used the checklists.

Interviews with colleagues of the PF indicated that he was concerned about the schedules he was flying. About 7 weeks before the accident he told a colleague that the schedules were becoming more demanding because they were flying up to three legs per night. The PF told him "I can't do this until I retire because it's killing me." He had a similar conversation with another colleague the night before the accident. In that conversation, they discussed the flight schedules and the PF said the schedules were "killing him" and he could not keep it 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.

1.1.1. The PF's Pre-accident Activities

The PF's pre-accident activities are summarized below and in table 1. Because the PF lived in the eastern time zone, all times for the PF's pre-accident activities in this section have been converted to eastern daylight time (edt).

The PF was off duty August 5-9, 2013.

On August 9, 2013, PED activity began at 0936. There was an extended break[4] in PED activity of at least 1 hour from 1000 until 1120. About 1745, the PF called UPS crew scheduling and reported being sick, cancelling his trip scheduled to begin on August 10. He told the crew scheduling technician that he would pick up his trip in SDF scheduled on August 13. PED activity resumed at 2259 until 2322. According to his wife, she and the PF attended a family reunion on August 9-11 in Catawba, South Carolina, about 30 minutes from where they lived. They arrived home on August 10 about 0100 and went straight to bed because they had to be "up early" the next day.

On August 10, it is unknown when the PF woke up. PED data showed activity at 1023 and from 1119 until 1122. There was no PED activity the rest of the day with the exception of a missed call at 1711. According to his wife, they had to be at the family reunion by 1500 for dinner. He and his wife returned home about 0100 on August 11 and went straight to bed.

[4] An extended break is considered to be 1 hour or more of no activity.

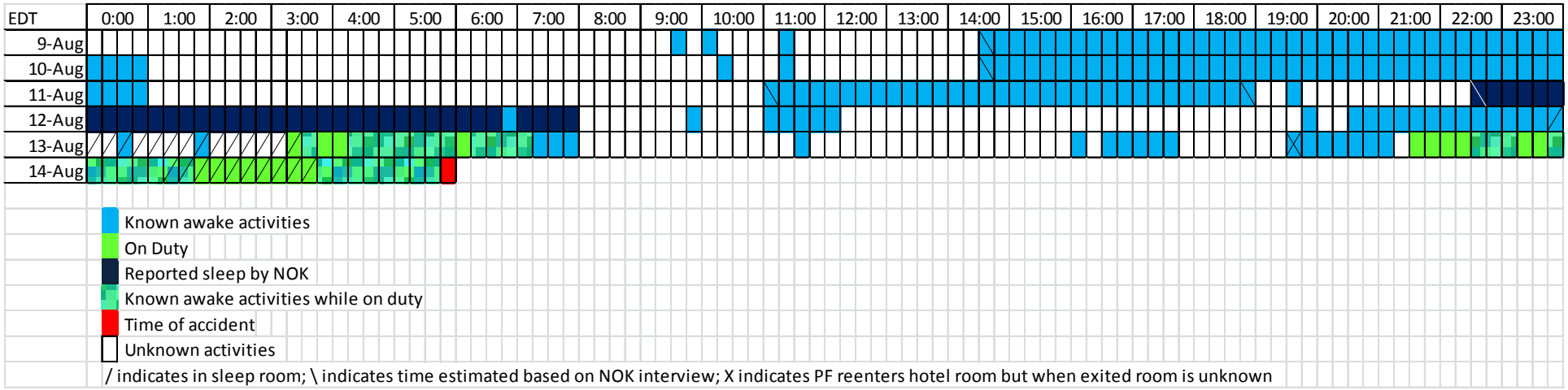
On August 11, it is unknown when the PF woke up. The PF's wife said they went to church, visited with an aunt and then attended the family reunion. They returned home about 1800, took their daughter to dinner, then came home and watched TV before going to bed. The PF made a call to check his voicemail at 1815 which was the only PED activity the day. The PF logged into the Crew Flight Operation system at 1936. The PF's wife could not recall at what time they went to bed but said they usually went to bed about 2230-2300 and would watch TV.

On August 12, the PF logged into the UPS Crew Flight Operations system at 0652 and 0959; his actual wake time is unknown. The PF's wife stated he paid bills, picked up his uniforms he had altered, ate lunch, took a nap, and then got ready to go to the airport. She did not recall the times that he took a nap but said it was his routine. PED activity began at 1100 until 1214. There was an extended break in PED activity from 1215 until 1952 when the PF's PED data indicated he connected to his home's Wi-Fi. PED activity occurred from 2040 until 2115 and the PF logged into the UPS Crew Flight Operations system at 2123. The PF's wife and daughter drove him to the UPS facility at CLT about 2130. The PF rode jumpseat on UPS flight 1285 which departed about 2215 and arrived in SDF at 2332. He requested a sleep room at 2347 and entered the sleep room about 9 minutes later.

On August 13, it is unknown when the PF exited the sleep room. There was a break in PED activity from 0034 until 0157. At 0157, there was 3 minutes of PED use. The PF went on duty at 0314 and a colleague and friend reported speaking with the PF around 0330. The accident crew departed SDF on UPS flight 618 at 0426, and flew to General Downing – Peoria International Airport, Peoria, Illinois (PIA) then to Chicago/Rockford International Airport, Rockford, Illinois (RFD), arriving at 0653. According to the hotel shuttle log, the accident crew was picked up from RFD at 0648 and arrived at the hotel at 0701. Hotel key swipe logs indicate the PF entered his room at 0721. PED activity resumed at 0738 and from 0745 until 0756. There was an extended break in PED activity from 0756 until 1147, from 1148 until 1610, and from 1745 until 1935. The PF exited his hotel room at some point during the day and returned to his room at 1934. His wife said they spoke around 2030 before the shuttle arrived to take him to the airport. They talked about his day and he told her he got rest. He did not discuss his other activities during the day but she said his routine was to go for a walk. The accident crew departed the hotel at 2106 for RFD and went on duty at 2136. The accident crew departed RFD on UPS flight 617 at 2234 and flew to PIA then SDF, arriving in SDF at 0057.

On August 14, upon arrival in SDF, the accident crew took the shuttle to the Air Services Center (ASC) at 0058 edt. The PF requested a sleep room at 0109 and entered the room about 7 minutes later. There was no PED activity after 0144. The PF was shown to exit the sleep room at 0347 via closed circuit TV. The PF logged into the Crew Flight Operations system at 0354. Shuttle logs indicate the accident crew departed for the accident airplane at 0406 and the accident flight departed SDF on UPS flight 1354 at 0455.

Table 1. Graphical depiction of PF's pre-accident activities.[5]



[5] All times converted to edt for graphical depiction.

1.1.2. The PF's Health

The PF's most recent first class medical certificate, issued by the FAA, was dated 04/16/2013, and had the limitation "Must have available glasses for near vision." No medications were listed in his FAA medical records. His wife described his health as good and said it had improved in the last 12 months because he had started exercising. He did not smoke, exercised regularly, and drank alcohol occasionally[6]. A prescription for Diovan[7], dated 5/20/2013, was found in the captain's personal effects. His wife stated he took the medication each morning before he had breakfast. She did not recall when he was prescribed the medication. She also stated he took vitamin E and D supplements but she was not sure how often he took those.

Regarding the sick call made by the PF on August 9, 2013, his wife was not aware of him being sick or having any recent illness or injury. According to the PF's UPS Exception History report, the PF had called in sick for 15 total days in 5 occurrences over the previous 13 months. The sick call triggered a review by the PF's assistant chief pilot (ACP).[8] He had not made a sick call since March 1, 2013. At the time of the sick call in March, the PF had called in sick for 28 total days in 6 occurrences over the previous 13 months. That call also triggered a review by the PF's ACP.

1.2. The Pilot Monitoring (PM)

The pilot monitoring (PM), age 37, was based at Louisville International-Standiford Field Airport (KSDF), and lived in Lynchburg, Tennessee, with her husband. Her husband reported that when off duty she tried to be in bed about 2000 and would be on the computer for 30-60 minutes before going to sleep. She would sleep through the night and would wake up about 0600-0700. She had no major changes, good or bad, to her health, financial situation, or personal life that would have impacted her performance on the day of the accident.

One pilot who flew with the PM described her as a "top notch person" who was very approachable. She was a very professional aviator and followed the procedures. Another pilot who flew with the PM stated she was efficient, did her job, was on time and was someone you could depend on. She used the procedures as trained. No pilots were concerned about flying with the PM or her CRM skills, and all believed that she would speak up to a captain if necessary.

The PM had spoken to her husband in the past about being tired at the end of the day but he said she would not fly if she was not able to. He said she was a responsible, professional person. She had discussed her schedules with her husband and said she felt that cargo pilots were more and more being pushed a little bit. A friend and colleague of the PM stated that he did not think she would call in fatigued; he said they were more of 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. The friend stated it was something that had become an epidemic that they almost laughed about and it was hard to know which of her comments were serious and which were a joke. They also recently discussed how the schedules had deteriorated and crews were

[6] His wife did not remember the last time he had an alcoholic beverage.
[7] Diovan is a prescription medication used to treat high blood pressure.
[8] According to a discussion with Robyn Wright who administered paperwork related to sick calls, 6 or more absences in a 12-month period could trigger a review by the assistant chief pilot (ACP).

flying more legs. They had this conversation often. A pilot walking through the SDF "ready room" in March 2013, witnessed the PM with her face down on the table. He approached her and she said she was "totally exhausted" and although she had a sleep room, it was an exterior room.[9] He encouraged her to call in fatigued. A pilot who recently flew with the PM on a week-long trip felt that toward the end to the week, although she was responding to radio calls, she was "zoning out" during the cruise portion of the flight. He commented to her that she looked tired and she told him she was a little.

1.2.1. The PM's Pre-accident Activities

The PM's pre-accident activities are summarized below and in table 2.

The PM was off duty August 4-9, 2013. It is unknown when the PM commuted from her home in Tennessee to SDF to report for duty on August 10. Her husband reported that she would drive to SDF which was about 3.5-4 hours from their home. She sometimes drove to her parents' house, about 20-30 minutes from their home, visit with them and sleep there before driving to SDF. PED data indicates usage on August 9 from 2346 until 0259 (0359 edt) on August 10.

On August 10, the PM went on duty at 0356 edt. The PM flew as flightcrew on UPS flight 784 departing SDF at 0457 edt and arriving at San Antonio International Airport (SAT) at 0610 cdt. At 0625, the PM went off duty for about 62 hours and 30 minutes. PED data indicated use from 0623 until 0649. According to the hotel shuttle log the PM arrived at the hotel at 0657. PED activity resumed at 0810 until 0843. The PM traveled from SAT to Houston, Texas, via Dallas, Texas, using jumpseat privileges on Southwest Airlines to visit a friend. She departed SAT at 0825 and arrived in Houston about 1105. PED data showed activity at 0942 and 1121. At 1222, PED activity resumed until 1323. There was an extended break in PED activity of more than 1 hour from 1324 until 1506. PED activity resumed with no extended breaks until 2327. It is unknown when the PM went to bed.

On August 11, it is unknown when the PM woke. PED activity began at 0858. There were several extended breaks in PED activity throughout the day: 0901 until 1030, 1254 until 1413, 1504 until 1618, 1648 until 1824, 1825 until 2029, and 2032 until 2343. Her husband said she texted him during the day and told him she was resting. She said she was tired and felt bad that she was not able to spend as much time with her friend because she was sleeping the whole time. PED activity continued from 2344 until 0117 on August 12.

On August 12, PED activity resumed at 0744. The PM logged into AirUPSers.com at 0927 and UPS Crew Flight Operations at 0942. There was an extended break in activities of at least 1 hour from 0943 until 1044. The PM departed Houston for SAT on Southwest Airlines at 1325. PED data indicated activity from 1401 until 1720. There was an extended break in activity from 1720 until 1841 when PED activity resumed. According to a friend who spoke to the PM on August 12, she told him via text that she would "pay big money to sleep" but it was time for her to get ready. According to the hotel shuttle log, the PM departed the hotel for the airport at 2030. She

[9] In his interview, the pilot said that exterior sleep rooms in SDF can have greater noise than interior sleep rooms. See attachment 3 of the Operational Factors Group Chairman's Factual Report.

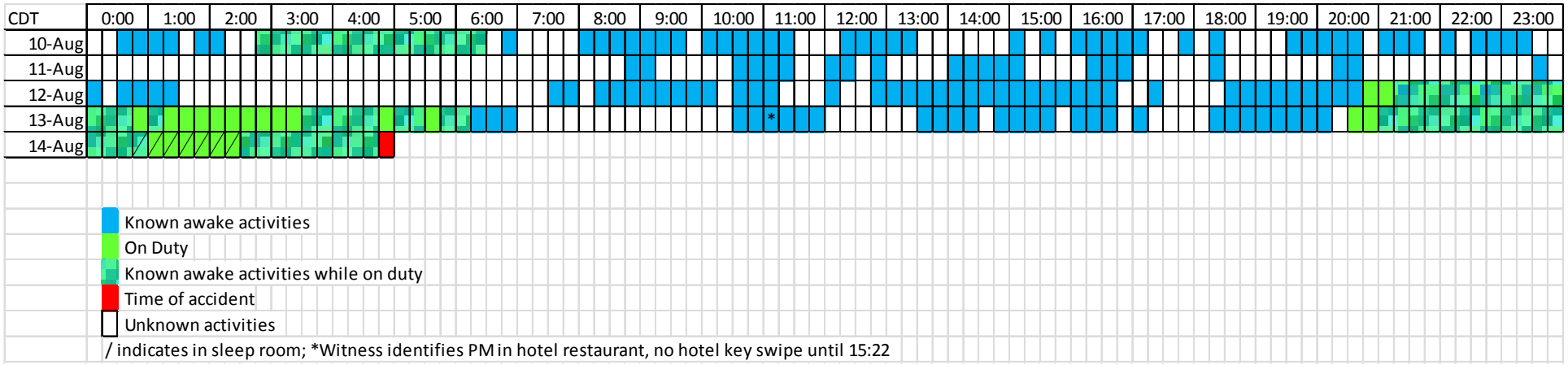
began her duty day at 2053. The PM operated UPS flight 789, departing SAT at 2151 and arrived in SDF at 0122 edt on August 13.

On August 13, after arriving from SAT, the PM talked with a colleague in the crew briefing room around 0125 edt, had PED use from 0126 edt until 0139 edt, and logged into the UPS Crew Flight Operations system at 0137 edt and 206 edt. Her activities from 0206 until her departure from SDF with the accident captain on UPS flight 618 at 0426 edt are unknown; no sleep room was secured. The accident crew departed for RFD via PIA and UPS records indicate that the accident crew arrived in RFD at 0553 cdt. The accident crew took the hotel shuttle van[10] to the hotel, checking in at the hotel at 0601. The PM entered her hotel room at 0620. She logged into the UPS Crew Flight Operations system at 0642 and had PED activity from 0645 until 0649. There was an extended break in activities from 0649 until 1043. A member of the hotel staff reported speaking with the PM in the hotel restaurant about 1100, and PED activity occurred until 1148. There was an extended break in PED activity 1148 until 1343, however, a review of the hotel's key swipe logs did not indicate that the PM reentered her room until 1522. PED activity resumed at 1343 until 1705 when there was an extended break in PED activity until 1827. At 1827, PED activity resumed until the accident crew departed the hotel for the airport via the hotel shuttle at 2006. Her husband said they spoke about 1915 while she was waiting for the shuttle van to take her to the airport. He said it was a regular conversation and she did not discuss how she was feeling or how she slept. She was "regular Shanda." The PM went on duty at 2036. PED activity stopped at 2124. The accident crew departed RFD for SDF via PIA on UPS flight 617 at 2134 and arrived in SDF at 0057 edt on August 14.

On August 14, upon arrival in SDF, the accident crew took the shuttle to the ASC at 0058 edt. The PM logged into the Crew Flight Operations system at 0109 edt and checked in to a sleep room at 0111 edt. She spoke to a colleague in the briefing room around 0120 edt before entering the sleep room at 0148 edt. There was an extended break in activities logged from 0150 edt until 0341 edt when closed circuit TV footage showed the PM exit the sleep room. The PM logged into the Crew Flight Operations system at 0344 edt. The shuttle took the accident crew to the accident airplane at 0406 edt and the accident crew departed SDF on UPS flight 1354 at 0455 edt.

[10] The hotel shuttle van log indicated it picked up the accident crew at 0548 cdt.

Table 2. Graphical depiction of PM's pre-accident activities.[11]



[11] All times converted to cdt for graphical depiction.

1.2.2. The PM's Health

The PM's most recent first class medical certificate, issued by the FAA, was dated 01/07/2013, and had no limitations. No medications were listed in her recent FAA medical records. Her husband said she was "as healthy as you get" and while she did not exercise regularly she worked with her horses a lot and got a "farm workout." She did not take any prescription medication that her husband knew of but she did take 1-2 gummy vitamins a day. She drank alcohol maybe one drink every 6 months and did not use tobacco products. She had no recent illness or injuries.

According to the PM's UPS Exception History, she called in sick four times in 2013. She last called in sick on July 14, 2013, which was her sixth sick call[12] in 13 months. She was contacted by her ACP following a sick call on March 20, 2013, and after the most recent sick call. She provided her ACP with a doctor's note in March and said she had a doctor's appointment in July. The ACP said he found nothing unusual about her most recent sick call. According to a friend of the PM, she would make sick calls but go to extremes to make sure she had a doctor's note.

According to a friend of the PM,[13] he thought she had an issue with her thyroid. She told him she was only eating one meal a day but was not losing weight.[14] At the time of his interview, he said she had discussed her concern about her thyroid with him "recently."

2.0. Medical and Pathological Information

Toxicology tests were performed by the FAA's Civil Aerospace Medical Institute on specimens from both pilots. Specimens from the captain and first officer tested negative for carbon monoxide, ethanol and a wide range of drugs, including major drugs of abuse.

3.0. UPS Policies, Guidance and Training

UPS provided information to crewmembers on policies, guidance and training through its Flight Operations Manual (FOM) and Flight Operations Training Manual (FOTM).

The UPS FOM, volume 1, chapter 01 "Introduction", section 01.01 "General Information," subsections 01.01.01 "Overview" and 01.01.01.01 "Preface" stated:

> Policies contained in the Flight Operations Manual (FOM) are intended to achieve safety, service and economy. Writers of regulations and policies cannot foresee every circumstance however, some unforeseen circumstances require the use of good judgment to overcome obstacles to safety.
>
> Service and economy demand efficiency. Providing efficient service to our customers without wasting time or resources often depends on good judgment. A clear

[12] The 6 sick calls resulted in 20 sick days total.
[13] See attachment 2 of the Operational Factors Group Chairman's Factual Report.
[14] Hydroxycut supplements for weight loss were found in the PM's personal effects.

understanding of policies and procedures allow for sound decisions that achieve the highest level of safety, service and economy.

3.1. Fitness for Duty Policy and Guidance

The UPS FOM, volume 1, chapter 02 "Administration", section 02.04.02 "Crewmember Fitness For Duty," subsection 02.04.02.01 "Introduction" stated:

> UPS crewmembers are expected to report for all assignments fit for duty. Further, UPS crewmembers are prohibited from operating aircraft if they are not fit for duty. Fitness for duty is defined as being physiologically and mentally prepared and capable of performing assigned duties.
>
> Crewmembers must notify Crew Scheduling immediately if they are not fit for duty for any reason.
>
> This decision is vital to safety and the notification must occur without hesitation. Crew Scheduling will remove the crewmember from service and provide further assistance, as required.
>
> Fitness for duty includes, but may not be limited to, being free from illness, injury, fatigue, scuba diving restrictions, blood donations, alcohol, drugs, etc.

The UPS FOM, volume 1, chapter 02 "Administration", section 02.04.02 "Crewmember Fitness For Duty," subsection 02.04.02.05 "Fatigue" stated:

> Do not operate as a crewmember if fatigue compromises your ability to safely perform your assigned duties. Crewmembers are expected to report for duty rested and prepared for scheduled duty periods. Duty periods may include revision or reschedule as defined by the Collective Bargaining Agreement.
>
> **NOTE:** In addition to notifying Crew Scheduling, crewmembers who determine they cannot perform assigned duties due to fatigue, are required to complete a Fatigue Event Report.[15]
>
> Refer to the "Fatigue Risk Management" section of Chapter 05, Crew Resource Management (CRM) for additional guidance.

The UPS FOM, volume 1, chapter 02 "Administration", section 02.04.02 "Crewmember Fitness For Duty," subsection 02.04.02.06 "Injury or Illness" stated:

> Pilots will not operate as crewmembers if they have an illness or injury that may affect their ability to do their job safely and properly. Crew Scheduling will be notified immediately by the crewmember upon experiencing any injury or illness that results in

[15] For more information, see sections 3.3.3 and 3.3.4 of this report.

being unfit for duty. The Company may require a crewmember to undergo a medical examination before returning to work from an absence of 30 days or more.

3.2. Crew Resource Management Policy and Training

The UPS FOM, volume 1, chapter 05 "Crew Resource Management", section 05.01 "General," subsection 05.01.01.02 "What is crew resource management?" stated:

> One of many definitions of Crew Resource Management (CRM) is 'The effective utilization of all available resources, information, equipment and human ability to achieve a safe and efficient flight operation.' To this extent, sound inter-personal relations must exist within the cockpit in order to engender a free flow of information among the crewmembers, without fear or reservation.
>
> Crewmembers are ultimately responsible for the safe conduct of the flight. Implementation of CRM at UPS empowers crewmembers to exercise their judgment and skills to avoid undesired consequences. Essentially, every detail consistent with cockpit function requirements shall be duly assigned and accepted as an individual's responsibility prior to the commencement of a flight operation. These requirements are described in detail in our various operation manuals (i.e., FOM, AOM and OpSpecs) specific to each fleet. As crewmembers you are expected to know and understand all of these available resources as well as how to engage the external resources so often talked about in the various CRM training events you have experienced throughout your career. Along with the crewmembers, the Flight Control Dispatcher who does your flight planning and flight monitoring should be considered a critical part of the team.

The UPS FOM, volume 1, chapter 05 "Crew Resource Management", section 05.01 "General," subsection 05.01.01.03 "What is threat and error management?" stated:

> Line Oriented Safety Audits (LOSA) conducted by academic researchers have shown that, on average, five to six errors occur on every flight. Most errors are either caught or have a minor overall effect on the safety of the flight. Threat and Error Management (TEM) is a structured method for dealing with and formalizing a set of procedures to avoid or mitigate errors. In the past, as crewmembers, we typically either communicate or acknowledge various "known" threats to avoid errors that could affect the safety of flight (e.g., weather, terrain, fatigue, ATC). However, some threats can occur outside these "known" or "anticipated threats" again creating possible errors and affecting the safety of flight (e.g., aircraft systems failures, routing changes, etc.). In either case using the TEM model has proven effective tool in airline operations to combat these "known" and "unknown/unanticipated" threats.
>
> The TEM model's first level of defense is to elevate the level of awareness for known threats to avoid possible errors. The next level is, if an error does occur, to "trap" the error and avoid possible minor deviations of flight (e.g., altitude or air speed) or exceeding any aircraft limitations (e.g., flaps, gear etc.). A last line of defense, if these errors cannot be trapped, is to make the appropriate corrections or mitigate the deviation

to avoid an "Undesirable Aircraft State" (e.g., stall, CFIT) or worse, an aircraft accident or incident. TEM has proven effective in both airline operations as well as in other industries by increasing the margin of safety and avoiding undesired outcomes.

For additional information on UPS' CRM/TEM policy and guidance, see attachment 2 to this report.

The UPS FOM, volume 1, chapter 05 "Crew Resource Management", section 05.03 "Internal Human Factors," subsections 05.03.01 "General" and 05.03.01.01 "Overview" stated:

Stress, fatigue, personalities, cultural backgrounds, gender, managerial styles, etc. are all "internal" human factors affecting our world in aviation as well as outside our careers. We all deal with these factors in many different ways and how we deal with them can affect our performance.

At UPS our time critical around-the-clock worldwide operations hugely influence our ability to operate at peak proficiency. These "external" factors impact negatively on our abilities to cope with "internal" factors.

So how do we manage these internal human factors? They are in fact considered internal "threats" and managing them decreases the risks associated with them. Though there are no simple answers or solutions, we do have tools and past experience to help us.

Tools listed in the UPS FOM to help manage these threats included standardized procedures, checklist discipline, training and interpersonal skills. For additional information, see attachment 3 to this report.

3.2.1. CRM/Safety Briefing

Crewmembers are also required to perform a CRM/Safety briefing prior flight. The UPS FOM, volume 2, chapter 02 "Flight Operations", section 02.02 "Preflight," subsection 02.02.07.03 "CRM/Safety Briefing" stated, in part:

The CRM/Safety briefing serves dual roles; allowing the Captain to set a good CRM tone for the flight and allowing complicated procedures to be discussed in detail prior to engine start when workload and distractions can be minimized. At some airports, the ATC clearance may not be available prior to taxi. At these airports, the anticipated clearance should be thoroughly briefed. The actual ATC clearance must be reviewed during the Takeoff briefing conducted during taxi-out.

The CRM/Safety briefing should be tailored as necessary to fit the needs of the flight crew for the anticipated departure environment.

CRM briefing objectives include the following:

(1) Setting a good tone in the cockpit to encourage safe and efficient flight crew coordination
   (a) Establishing open lines of communications between all crewmembers, including encouraging the communication of all known threats as soon as they become apparent
   (b) Setting the expectation that standard operating procedures will be followed
   (c) Stimulating good Situational Awareness (SA) and communicating when SA has degraded
   (d) Rejected Takeoff Procedures and Philosophy (Include any safety related issues which may affect the decision to reject such as Weather, MEL deferrals, Windshear etc.)

3.2.2. CRM Steering Committee

The CRM Steering Committee was made up of management and line pilots from each fleet. The committee met quarterly and reviewed CRM issues and recommended any changes to CRM training to the Director of Training and Standards. The committee focused primarily on the threat and error management model, which they did through all of their training, facilitated debriefs and getting out on the line as much as possible. In 2013, the committee developed a character called "Max Threat" who represented threats to crews in the cockpit. The committee depicted "Max Threat" in several videos in which the character would create "mayhem" during the flight. The purpose was to get crewmembers to understand how to use CRM to get rid of "Max Threat." These videos were included in CRM training.

3.2.3. Crew Resource Management Training

UPS crewmembers were trained on the "Big Six" model of CRM – communications and briefings, "what if" planning, time management, teamwork and leadership, automation management, and situational awareness. According to the Advanced Qualification Program Manual (AQPM), CRM was included in all aspects of A300 ground and flight training. The qualification curriculum ground training included CRM/TEM on day 16 workshop 8[16] in which crewmembers must apply CRM skills and exhibit adequate knowledge of communication processes, crew coordination, situational awareness, and problem solving/decision making processes. CRM was also accomplished during all flight training events, throughout qualification and continuing qualification (CQ) curriculum and was emphasized during all briefs and debriefs. Specifically, in qualification training crewmembers were presented with six line oriented simulations, each focusing on one tenet of the "Big Six" model of CRM.

Captain upgrade training included 2 hours of CRM training focused on applying CRM skills to be an effective captain. The training covered CRM responsibilities as a captain, including provide leadership, clear communication, good decision making, employ and promote good situational awareness, and technical proficiency. Training also reviewed the consequences of

[16] According to the AQP A300 Initial/Transition Student Guide, workshop 8 is a 3 hour class that also covers aircraft exterior inspection and maintenance procedure review.

fatigue, including increased vulnerability to mistakes, decreased situational awareness, poor decision making, overestimate of one's level of ability and fixation/slowed reaction time.

Prior to AQP, crewmembers of all fleets received training as presented in the UPS Flight Operations Training Manual (FOTM). According to the UPS FOTM, chapter 19 "Resource Management Training," section 2 "Crew Resource Management Training," CRM training was comprised of five components:

(1) CRM Initial Training (5 hours) was provided to a newly assigned crewmember in Flight Operations and covered challenges of the new hire, new hire conflict management, and fatigue management.

(2) CRM Flight Crew Factors Seminar (16 hours) was provided to flight crewmembers that had completed no less than 12 months service as a UPS crewmember, but normally between 18 and 36 months of service, and covered effective/ineffective behavior, communication/conflict management, situational awareness, team building, fatigue, decision making/problem solving, threat and error countermeasures, automation threats and errors, and future actions.

(3) CRM Recurrent Training was provided to flight crewmembers, current and qualified or enrolled in an initial, transition, upgrade, AQP, recurrent or requalification curriculum, and included a review of CRM issues during line oriented flight training (LOFT).

(4) CRM Check Airman/Instructor Training (6 hours) was provided to a UPS employee assigned as a line check or proficiency check airman or flight instructor and covered communication, situational awareness, threat and error management, grading and analysis, and facilitated debriefing. It also focused on the continual reinforcement of CRM principles in all facets of line operations.

(5) The New Captain Command Course (8 hours) was provided to a UPS employee who was a first-time captain at UPS and covered threat and error management relevant to command, decision making, agencies and organizations, a tour of the GOC/GOC video, a meeting with the chief pilots/FAA, and leadership. This course was scheduled as part of the captain's upgrade or initial training prior to being released to the line.

The "Big Six" model of CRM was covered in initial CRM training and the CRM flight crew factors seminar in the form of PowerPoint and video presentations, as well as open discussions and role play. During recurrent training, crewmembers were observed demonstrating CRM skills during simulator scenarios.[17] Deficiencies observed were discussed during a facilitated debrief.

[17] See section 19.2 "AQP Grade Scales" of the Operational Factors Group Chairman's Factual Report for more information on the grading scale and reason codes used during training.

Table 3. Most recent crew resource management training received by the flightcrew.

Flightcrew Member	Initial (FOTM)	Flight Crew Factors (FOTM)	Upgrade (AQP)	CQ (AQP)
Pilot Flying (PF)	5/12/1993	5/12/1993	5/27/2009	6/26/2013
Pilot Monitoring (PM)	11/30/2006	2/25/2009	N/A	6/26/2013

3.3. Fatigue Risk Management

The UPS Fatigue Risk Management Plan was outlined in the UPS FOM, volume 1, chapter 05 "Crew Resource Management", section 05.04 "Fatigue Risk Management," subsections 05.04.01 "Fatigue Risk Management Plan (FRMP)" and 05.04.01.01 "FRMP Overview." Specifically, it stated:

> Fatigue risk management is a continuous improvement process that identifies, assesses and mitigates the risk of fatigue by guiding organizational and/or policy change and fatigue risk management promotion through training and communication.
>
> A comprehensive UPS FRMP collects and analyzes fatigue data to proactively manage fatigue threats and ensures unacceptable risks are mitigated. Fatigue training is incorporated into annual training for all crewmembers, crew schedulers/crew resource personnel, dispatchers and operational decision-makers. The UPS FRMP has been approved by the FAA. The FRMP scheduling limits are representative of the UPS/IPA Collective Bargaining Agreement.
>
> The global, 24 hour nature of operations including backside-of-the-clock flying, flights crossing multiple time zones and the range associated with modern aircraft can create challenges for air carriers and crews in managing rest. Therefore, it is imperative that UPS Flight Operations personnel proactively manage alertness and mitigate fatigue.

For additional information on UPS FRMP, see attachment 4 to this report.

3.3.1. Flight Crew Alertness Guide

The Fatigue Safety Action Group (FSAG) was responsible for the fatigue education at UPS and developed the Flight Crew Alertness Guide provided to crewmembers in the FOM.[18] The guidance provides crewmembers with practical tips for obtaining adequate sleep, recovering from a sleep debt, and identifying sleep problems/disorders. The alertness guide was developed

[18] This guidance was provided to crewmember in the UPS FOM, volume 1, chapter 05 "Crew Resource Management", section 05.03 "Internal Human Factors", subsection 05.03.02 "Flight Crew Alertness Guide." See attachment 5 to this report.

in conjunction with an outside consultant and was provided to the IPA to review prior to publication.[19]

3.3.2. Fatigue Training

AQP CQ training covered fatigue causes and countermeasures during the general subjects curriculum segment. Presentation of fatigue materials alternated between a forum and homestudy. According to the AQPM, fatigue training is included in a forum for evaluation years 2011, 2012, 2014 and 2015 and in homestudy for evaluation years 2010, 2013, and 2016. The 2013 CQ Homestudy document's review of fatigue covered the UPS FRMP, safety culture and FRMP, and joint responsibility between the company and crewmembers to ensure fitness for duty as outlined in the UPS FOM. The document provided additional guidance, specifically section 05.09 "Sleep/Rest/Exercise/Eating" stated,

> It cannot be overstated that sleep or lack of sleep greatly affects our level of performance. Sleep is a resource that must be managed. Managing our sleep is imperative if we are to maximize our ability to handle both routine flying tasks and possible emergency situations. Sleep deprivation is cumulative and diminishes your ability to operate safely. It is each crewmembers responsibility to assure that they manage their duty free periods so as to report to work fully rested.
>
> Because UPS operates worldwide in all time-zones it can be a challenge to properly manage your rest. Your ability to communicate to other crewmembers and the company on the status of your readiness to fly is important in evaluating your ability to function as a viable crewmember. Proper exercise and eating habits also help minimize the effects of fatigue. Studies show that moderate exercise completed several hours before bedtime can help in assuring restful sleep. Also, before bedtime avoid large or heavy meals and alcohol which have been found to interfere with sound sleep.

Training for fatigue was included in CRM initial training and the CRM flight crew factors seminar, each for 1 hour 30 minutes. According to the UPS FOTM, chapter 19 "Resource Management Training," section 2 "Crew Resource Management Training," the fatigue curriculum segment covered 13 areas:

1. Review of FAA flight, duty and rest regulatory requirements.
2. Awareness of the FRMP program itself, including fatigue related policies and procedures, and the responsibilities of management and employees to mitigate or manage the effects of fatigue and improve flightcrew member flight deck alertness.
3. The basics of fatigue, including sleep fundamentals and circadian rhythms.
4. The causes and awareness of fatigue.
5. The effects of operating through multiple time zones.
6. The effects of fatigue relative to pilot performance.
7. Fatigue countermeasures, prevention, and mitigation.
8. The influence of lifestyle, including nutrition, exercise, and family life, on fatigue.

[19] According to the UPS flight compliance supervisor, IPA's review of a FOM publication was not usual.

9. Familiarity with sleep disorders.
10. The effects of fatigue as a result of commuting.
11. Pilot responsibility for ensuring adequate rest and fitness for duty.
12. Operational procedures to follow when one identifies, or suspects, fatigue risk in oneself or others.
13. Lessons learned regarding the effects of fatigue and mitigation initiatives relative to the certificate holder's operations.

Although fatigue was included in CRM training and presented as a potential threat to flight, fatigue was not specifically trained in any training program as a threat that should be included in the CRM/Safety briefing prior to takeoff. The FAA aircrew program manager (APM) and crewmembers interviewed indicated that fatigue would not be included in a briefing before takeoff.[20]

3.3.3. Fatigue Events

According to the UPS FOM guidance, a crewmember who was not fit for duty due to fatigue should not operate an airplane if it compromised their ability to safely perform the assigned duties. A crewmember who notified crew scheduling that they were fatigued would immediately be removed from the schedule. The crew scheduler could ask the pilot three questions: 1) was the pilot unfit for duty; 2) was there anything UPS could have done to prevent it (like a problem with the hotel or something that could be prevented for the next crewmember); and 3) when the crewmember will be fit for duty again (to make sure they are covering the open trips). The scheduler could not challenge a crewmember about being fatigued.[21] The crewmember would then be required to complete a fatigue event report within 21 days.[22]

According to the UPS air division manager of crew services, in 2013, UPS reviewed about 100 fatigue calls and that number had been trending down for the last couple of years. In 2011, there were more than 250 fatigue calls. When asked why the trend was lower, the manager stated that to some degree they looked at areas of concern that raised itself to a moderate risk level and they would look to mitigate it. The manager also stated that the professionalism of the pilot group came into play.

The IPA co-chair of the Fatigue Working Group stated the highest incidence of fatigue calls came in on Thursday and Friday, the latter part of the week, when it was the third consecutive night on duty. Reasons as to why fatigue calls happened included long duty periods sandwiched by short rest periods, multiple 24-hour layovers, four leg trips (two into the sort and two out of the sort), and lack of facilities throughout the system, especially internationally where a crew might sit on the airplane for 3-4 hours because there is no rest facility like in SDF. The UPS

[20] See attachment 2 of the Operational Factors Group Chairman's Factual Report.
[21] According to the Fatigue Working Group IPA co-chair, prior to 2006, there was no process for how to handle a fatigue call.
[22] It was recommended that the fatigue event report be completed within 24 hours of the event to provide the most complete summary of the event but a crewmember had 21 days. If an event report was not submitted within 21 days, the flight compliance supervisor/UPS co-chair of the Fatigue Working Group would follow up with the crewmember. If a fatigue event report was not submitted, the crewmember's sick bank would be debited.

Fatigue Working Group co-chair stated the A300 had more fatigue calls than other fleets. A vast majority of the fatigue calls were "line no changes." These were lines that the crewmembers bid and received, and there were no changes to the lines, no reschedules, no major delays, no changes. There were no differences in the types of lines between the Airbus and the B757 domestic. It was a basic week on week off line. The second highest category for fatigue calls were hotel issues.

UPS and IPA representatives on the Fatigue Working Group disagreed on whether the fatigue process was punitive.[23] The working group IPA co-chair stated that pilots viewed the fatigue process as a penalty system. However, working group UPS co-chair believed the fatigue process itself was not punitive. Even if a crewmember's sick bank was debited, the crewmember could restore their debited sick bank within the same pay period or the next two pay periods. He stated there was no letter placed in a crewmember's file regarding the fatigue call, however, an item would be noted in the crewmember's exception history. Similarly, the UPS Air Division Manager of Crew Services said UPS had a "no fault" fatigue policy; he was not sure if it was stated in the FOM but said it "certainly was understood."

Crewmembers interviewed by the Operations/Human Performance Group indicated they would call in fatigued if they were; more than half of the pilots interviewed said they had called in fatigued.[24] One pilot had called in fatigued three times; on the second occasion he was thoroughly questioned and on the third occasion his sick bank was debited. He said it was now in the back of his mind thinking of what would be said to him when calling in fatigued.[25] Another pilot indicated there were no consequences when he called in fatigued.

Neither the PF nor the PM had filed a fatigue event report at UPS.

3.3.4. Fatigue Event Review Process

If a crewmember reported a fatigue event which required a removal from duty, the event was reviewed a minimum of two times. The first review was made by the UPS flight compliance supervisor (also the co-chair of the Fatigue Working Group) and scheduling supervisor. The flight compliance supervisor would be notified first. He would receive a tape recording of the phone call, the crewmember's schedule as planned and as flown, and the fatigue event report.[26] The flight compliance supervisor would also review the crewmember's attendance for the previous 18 months using the exception history report to give it a "sniff test" to determine if the crewmember may have an issue he needed help with. Once a week, the flight compliance supervisor met with the scheduling supervisor to review the fatigue calls received, which they called the chief pilot fatigue review. The tape recording, schedule as planned and flown, and the event report would be reviewed. Additionally, the supervisors would review the information using the Sleep, Activity, Fatigue, and Task Effectiveness (SAFET) model developed by Dr. Steve Hursh. A determination would be made whether to debit or not debit the crewmember's

[23] See attachment 2 of the Operational Factors Group Chairman's Factual Report.
[24] See attachments 1-3 of the Operational Factors Group Chairman's Factual Report
[25] See attachment 1 of the Operational Factors Group Chairman's Factual Report.
[26] The fatigue event report was usually received by the flight compliance supervisor within 24 hours of the fatigue call.

sick bank for the fatigue call.[27] If the chief pilot's review determined that the crewmember not be debited, the crewmember would not lose hours from his sick bank.

Every fatigue call, whether an initial determination was made to debit or not debit during the first review process would be de-identified and reviewed a second time by the Fatigue Safety Action Group[28] (FSAG). For each event, a root cause analysis was completed, cause(s) determined and an action was taken. Actions included referring a crewmember to the Alertness Guide, monitoring a particular hotel for 6 months, and monitoring fatigue reports for new occurrences of schedule shifts.

The Fatigue Working Group, co-chaired by a representative from UPS (the flight compliance supervisor) and IPA,[29] reviewed all events deemed to be "debit" by the chief pilot fatigue review a third time using identifiable information. In addition to the information reviewed in the previous two processes, the working group also reviewed any previous complaints on that schedule and the schedule trends for the month. The events were reviewed and a debit or no debit decision would be made. According to the flight compliance supervisor, every fatigue call was treated like a safety incident. A fatigue call meant that a crewmember had called to say they were not safe to operate an airplane and the Fatigue Working Group needed to know why. The decision by the Fatigue Working Group was the final say in the process. The IPA co-chair estimated that 90% of fatigue events were determined to be no debit by the Fatigue Working Group. The IPA co-chair stated the problem she saw with the process was that this review was the final phase. If the working group determined that a pilot was fatigued and to not debit his sick bank due to a pairing issue, for example, there was no additional process taken to ensure that another pilot would not be scheduled the same way.

If the Fatigue Working Group could not come to an agreement whether to debit or not debit a crewmember's sick bank, the event would be elevated to the IPA president and the system chief pilot for review. If no determination could be agreed upon by the IPA president and system chief pilot, UPS could debit the crewmember's sick bank in accordance with the memorandum of understanding (MOU).

UPS also encouraged crewmembers to report any fatigue events, even if not required, by submitting a Fatigue Event Report so that a root cause analysis can be conducted, threats identified, and mitigation taken if necessary.

3.3.5. Recent Fatigue Events

[27] At the end of each year, UPS crewmembers were paid at their hourly rate for any sick bank hours not used. The UPS/IPA contract Article 9A stated, "a crewmember will accrue sick leave at a rate equal to 5.5 hours for each pay period (13 pay periods per year) Potentially 71.5 hours paid."

[28] FSAG members included two members from the airline safety department (one a safety manager and another was a data analyst), 2 members from the chief pilot's office, one member from the crew scheduling department planning office, one member from the industrial engineering department who assessed implications and processes, and the flight operations compliance manager served as the chair in the regulatory compliance. A flight qualified supervisor was the administrator.

[29] The Fatigue Working Group also had one additional representative from IPA as a member.

A review of the FSAG meeting notes from June-August 2013 indicated that the group conducted a root cause analysis on 25 new fatigue events.

A review of the Fatigue Working Group meeting notes from June-August 2013 indicated that 13 events deemed "debit" by the FSAG were forwarded to the Fatigue Working Group for review. Six of 11 reports were deemed "no debit" by the working group and two were delayed until September for review.

3.4. Duties and Responsibility of Crewmembers

The UPS FOM, volume 2, chapter 02 "Flight Operations", section 02.01 "Flight Planning," subsection 02.01.01.04 "Duties and Responsibility of Crewmembers" stated:

> **ALL CREWMEMBERS**
> All crewmembers are expected to use proper judgement [sic] at all times to ensure the safe conduct of the flight.
>
> **CAPTAIN**
> (1) Allow only current and qualified crewmembers (same aircraft type) to occupy a control seat.
> (2) Occupy a control seat during takeoff and landing.
> (3) On flights with an augmented or heavy crew, determine each pilot's rest period after due consideration of individual desires and regulatory requirements.
> (4) Assume final responsibility and authority for the safe operation and conduct of the flight, at all times, including inflight rest periods.
> (5) Resolve all maintenance discrepancies and MEL considerations to his satisfaction.
> (6) Make the final decision regarding inflight diversion.
>
> **FIRST OFFICER**
> The First Officer's and IRO's (if applicable) primary responsibilities are to assist the Captain in the safe and efficient operation of the aircraft while performing assigned duties. They are also charged with the responsibility of immediately informing the Captain of unsafe conditions or improper handling which could place the aircraft or flight crew in jeopardy.

3.5. Crew Standardization and Professionalism

The UPS FOM, volume 2, chapter 02 "Flight Operations", section 02.02 "Preflight," subsection 02.02.06.01 "Crew Standardization and Professionalism" stated:

> Optimal flight crew coordination is a major goal and management objective of the UPS Flight Operations department. It is the responsibility of each crewmember to support this objective.
>
> Standardized procedures promote understanding and effective communications between crewmembers. Standardized procedures and effective communications are significant

factors in reducing error in the cockpit and in enhancing safety. All crewmembers must maintain a high level of knowledge/proficiency with all procedures including, but not limited to, standard operating procedures, aircraft limitations, immediate action items, normal and non-normal procedures.

It is mandatory that these standard operating procedures be utilized during all UPS flight operations. These procedures are designed to minimize any potential misunderstandings in cockpit communications and ensure the proper execution of normal and non-normal procedures.

4.0.UPS SDF Rest Facilities

UPS provided rest facilities at SDF.[30] The rest facilities were located in the Air Service Center (ASC) building on the second and third floors. All rest facilities were used on a first come first served basis. The facility included 124 private sleep rooms which could be checked out by a flight crewmember for up to 12 hours. Sleep rooms were accessed via an electronic keycard. The sleep rooms had a wall-mounted light, bed, small table attached to the foot of the bed and a telephone which could be used to schedule a wake-up call (see photos 1 and 2). When done with a sleep room, pilots would deposit the room key in drop boxes located around the facility (see photo 3). Crew sleep room information sheets were located throughout the hallways (see photo 4). UPS also provided three "quiet" rooms outfitted with recliners. One quiet room was more suitable for sleeping with the lights dimmed and a cabinet with blankets for crewmember use. The other two quiet rooms could be used to watch TV, read or perform other activities. According to the IPA representative and chair of the Fatigue Working Group, the rest facilities at SDF were "very nice."

The first floor of the ASC housed the "ready room" which was outfitted with tables and computers. Various desks were there to assist the crew, including jumpseats and sleep rooms. There was a filing cabinet for crewmembers to check out books. There was a cafeteria open 24 hours, 5 days a week and was closed on the weekends; vending machines were available 24-7.

[30] UPS stated that sleep rooms were also located at other sort facilities or facilities that had layovers of over 2.5 hours such as PHL, MIA, RKD, ONT, and EWR. Facilities without sleep rooms had recliners for crewmembers to use.

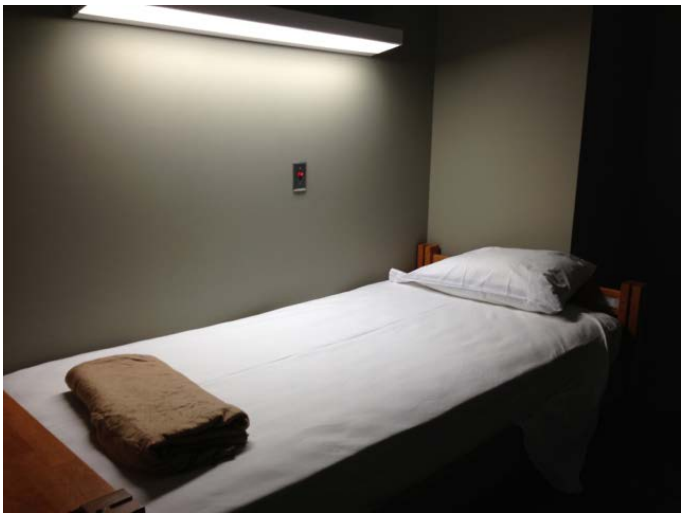


Photo 1. Sleep room at SDF ASC.

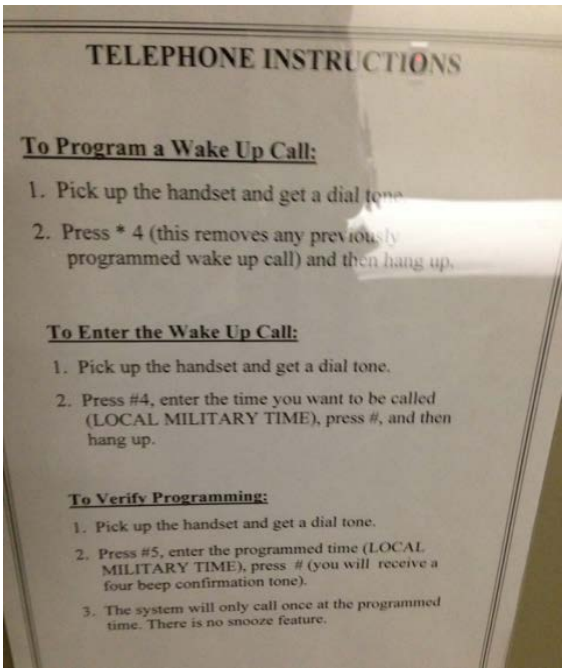


Photo 2. Instructions to schedule a wakeup call in sleep room at SDF ASC.

Photo 3. Sleep room key drop box located in elevator at SDF ASC.

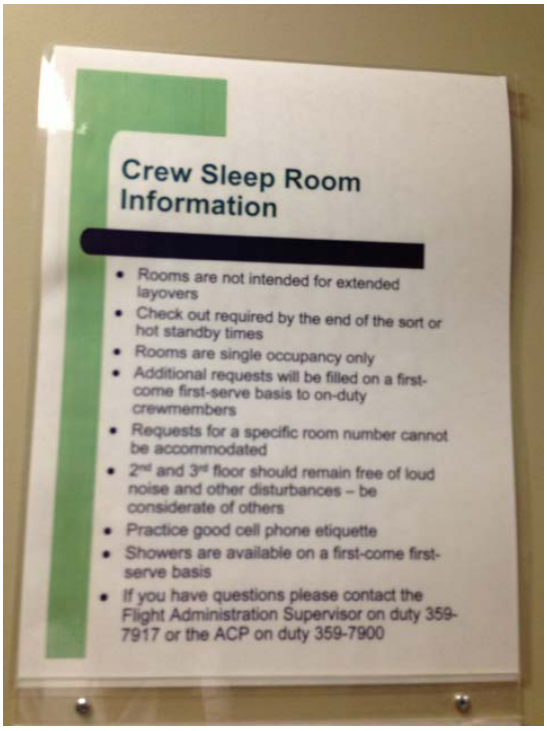


Photo 4. Sleep room information at SDF ASC.

Photo 5. Quiet room (no TVs) at SDF ASC.

Photo 6. Quiet room with recliners and wall-mounted TV at SDF ASC.

5.0. Flight and Duty Time Limitations and Required Rest

UPS 1354 was operating under the provisions of 14 CFR Part 121 Subpart Q which stated the flight time limitations and rest requirements for domestic operations. On January 4, 2012, the FAA published a final rule entitled, "Flightcrew Member Duty and Rest Requirements." In that rule, the FAA created new part 117,[31] which replaced the existing flight, duty, and rest regulations, contained in Subparts Q, R, and S, for part 121 passenger operations. These rules did not apply to non-passenger operations, however, as part of the rulemaking, the FAA permits all-cargo operations operating under 14 CFR part 121 to voluntarily opt into the part 117 flight, duty, and rest regulations. UPS has not opted into part 117.

[31] See attachment 6 to this report.

The UPS director of operations stated that the part 117 regulations would not benefit UPS because what they did was different than passenger operations. He said that UPS must ensure the outcomes were safe, however, in many things they did, there were alternate ways to achieve that. UPS airplanes were not flying all of the time because they were going through the night sort. He said crews were able to get rest, and their time was not spent entirely having to focus on instruments. Safety was paramount to what they did, but he believed his pilots were adequately prepared for their flying given the unique nature of what they did.

5.1. 14 CFR Part 121 Subpart Q

14 CFR Part 121 Subpart Q "Flight Time Limitations and Rest Requirements: Domestic Operations" stated:

§121.470 Applicability.

This subpart prescribes flight time limitations and rest requirements for domestic all-cargo operations, except that:

(a) Certificate holders conducting operations with airplanes having a passenger seat configuration of 30 seats or fewer, excluding each crewmember seat, and a payload capacity of 7,500 pounds or less, may comply with the applicable requirements of §§135.261 through 135.273 of this chapter.

(b) Certificate holders conducting scheduled operations entirely within the States of Alaska or Hawaii with airplanes having a passenger seat configuration of more than 30 seats, excluding each crewmember seat, or a payload capacity of more than 7,500 pounds, may comply with the requirements of this subpart or subpart R of this part for those operations.

(c) A certificate holder may apply the flightcrew member flight time and duty limitations and requirements of part 117 of this chapter. A certificate holder may choose to apply part 117 to its—

(1) Cargo operations conducted under contract to a U.S. government agency.

(2) All-cargo operations not conducted under contract to a U.S. Government agency,

(3) A certificate holder may elect to treat operations in paragraphs (c)(1) and (c)(2) of this section differently but, once having decided to conduct those operations under part 117, may not segregate those operations between this subpart and part 117.

§121.471 Flight time limitations and rest requirements: All flight crewmembers.

(a) No certificate holder conducting domestic operations may schedule any flight crewmember and no flight crewmember may accept an assignment for flight time in scheduled air transportation or in other commercial flying if that crewmember's total flight time in all commercial flying will exceed—

(1) 1,000 hours in any calendar year;

(2) 100 hours in any calendar month;

(3) 30 hours in any 7 consecutive days;

(4) 8 hours between required rest periods.

(b) Except as provided in paragraph (c) of this section, no certificate holder conducting domestic operations may schedule a flight crewmember and no flight crewmember may accept an assignment for flight time during the 24 consecutive hours preceding the scheduled completion of any flight segment without a scheduled rest period during that 24 hours of at least the following:
  (1) 9 consecutive hours of rest for less than 8 hours of scheduled flight time.
  (2) 10 consecutive hours of rest for 8 or more but less than 9 hours of scheduled flight time.
  (3) 11 consecutive hours of rest for 9 or more hours of scheduled flight time.

(c) A certificate holder may schedule a flight crewmember for less than the rest required in paragraph (b) of this section or may reduce a scheduled rest under the following conditions:
  (1) A rest required under paragraph (b)(1) of this section may be scheduled for or reduced to a minimum of 8 hours if the flight crewmember is given a rest period of at least 10 hours that must begin no later than 24 hours after the commencement of the reduced rest period.
  (2) A rest required under paragraph (b)(2) of this section may be scheduled for or reduced to a minimum of 8 hours if the flight crewmember is given a rest period of at least 11 hours that must begin no later than 24 hours after the commencement of the reduced rest period.
  (3) A rest required under paragraph (b)(3) of this section may be scheduled for or reduced to a minimum of 9 hours if the flight crewmember is given a rest period of at least 12 hours that must begin no later than 24 hours after the commencement of the reduced rest period.
  (4) No certificate holder may assign, nor may any flight crewmember perform any flight time with the certificate holder unless the flight crewmember has had at least the minimum rest required under this paragraph.

(d) Each certificate holder conducting domestic operations shall relieve each flight crewmember engaged in scheduled air transportation from all further duty for at least 24 consecutive hours during any 7 consecutive days.

(e) No certificate holder conducting domestic operations may assign any flight crewmember and no flight crewmember may accept assignment to any duty with the air carrier during any required rest period.

(f) Time spent in transportation, not local in character, that a certificate holder requires of a flight crewmember and provides to transport the crewmember to an airport at which he is to serve on a flight as a crewmember, or from an airport at which he was relieved from duty to return to his home station, is not considered part of a rest period.

(g) A flight crewmember is not considered to be scheduled for flight time in excess of flight time limitations if the flights to which he is assigned are scheduled and normally terminate within the limitations, but due to circumstances beyond the control of the certificate holder (such as adverse weather conditions), are not at the time of departure expected to reach their destination within the scheduled time.

§121.473 Fatigue risk management system.

(a) No certificate holder may exceed any provision of this subpart unless approved by the FAA under a Fatigue Risk Management System.

(b) The Fatigue Risk Management System must include:

(1) A fatigue risk management policy.

(2) An education and awareness training program.

(3) A fatigue reporting system.

(4) A system for monitoring flightcrew fatigue.

(5) An incident reporting process.

(6) A performance evaluation.

5.2. UPS/IPA Early Duty Window Operations

The UPS/IPA contract provided additional limitations on flight and duty times and rest requirements for operations during an early duty window (EDW).[32] Any operation that reported in, blocked in or overlapped with the EDW was considered an EDW duty period. The UPS/IPA contract limited a crewmember flying a domestic EDW window to not be scheduled a duty period that exceeds 11 hours on duty or to not be on actual duty for more than 13 hours. The 13 hours may be extended to 14 hours only if a crewmember's flight(s) was delayed due to weather, mechanical, ATC, or sort delays. Flight time limitations were governed by part 121 regulations. The contract further states that EDW operations shall not exceed four segments in a scheduled duty period and a crewmember cannot be scheduled more than four consecutive duty periods which contain four segments.

After completing an EDW duty period, a crewmember would receive 10.5 duty free hours of layover rest. If an EDW duty period was scheduled for 10.5 hours or more, or contained four segments, the crewmember would receive 12 duty free hours of layover rest. The 12 hour rest period may be reduced to 10.5 hours due to ATC, mechanical, weather and sort delays.

EDW duty periods shall not have more than four (4) segments. There shall not be more than four (4) consecutive duty periods which contain four (4) segments.

5.3. Comparison of Duty Time Regulations and Accident Pairing

See table 4 for a comparison of the accident crew schedule to regulations and limitations stated in 14 CFR part 121 subpart Q, the UPS/IPA contract, and 14 CFR part 117.

[32] Per the UPS/IPA contract, the early duty window is defined as the period of time from 0230 to 0459 local domicile time.

Table 4. Comparison of FAA duty times regulations to accident crew's duty period prior to accident.

	Part 121 Subpart Q	UPS EDW Operations	Part 117	Accident Crew Schedule[33]
Duty Time	N/A	11 hours	11 hours	8:11
Flight hours	8 hours	8 hours	8 hours	2:29
Rest Requirement	9 hours	10.5 hours	10 hours	14:28
Consecutive Nights	N/A	N/A	3 nights	2 nights

According to the air division manager of crew services, the UPS Fatigue Safety Action Group performed a comparison of the accident pairing to 14 CFR part 117 regulations and determined that the accident pairing, to the point it was flown, would have complied with part 117, but after the Thursday or Friday night operation it would not have been due to the consecutive nights of operations. UPS did not typically do a comparison of its flight pairings to determine if they were in compliance with part 117 regulations.

6.0. FAA Pilot Monitoring Training Regulations

In 2003, the FAA updated Advisory Circular AC 120-71A[34] to utilize the term "pilot monitoring" in place of "pilot not flying" as it was "increasingly acknowledged that it makes better sense to characterize pilots by what they *are* doing rather than by what they are not doing."

More recently, in November 2013, the FAA revised the training requirements for pilots in air carrier operations.[35] Notably are provisions that address pilot monitoring duties and training. Section §121.544 of the final rule establishes an operational requirement that flightcrew members follow air carrier procedures that state "the pilot not flying must monitor the aircraft operation," and §121.409 and appendix H requires "training on pilot monitoring be incorporated into existing requirements for scenario-based training." Compliance is required by all air carriers 5 years after the effective date of the final rule.

[33] Accident crew schedule for the rest period on August 13, 2013, and the subsequent duty period beginning on August 13 at 2036 cdt until the accident flight. Times in column are hh:mm.
[34] See attachment 7 to this report.
[35] See attachment 8 to this report.