NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

February 11, 2015

Group Chairman's Factual Report

HUMAN PERFORMANCE

DCA14MA081

A. ACCIDENT

Operator:	US Airways
Location:	Philadelphia International Airport (PHL), Philadelphia, Pennsylvania
Date:	March 13, 2014
Time:	1830 eastern daylight time (EDT)[1]
Airplane:	Airbus A320-214
Registration:	N113UW

B. OPERATIONS/HUMAN PERFORMANCE (HP) GROUP

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[1] All times are based on a 24-hour clock and eastern daylight time, unless otherwise noted. Time of the accident is approximate.

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C. SUMMARY

On March 13, 2014, at about 1830 eastern daylight time (EDT), US Airways flight 1702, an Airbus A320, N113UW, experienced a nose gear collapse and other damage after aborting the takeoff on runway 27L at Philadelphia International Airport (PHL), Philadelphia, Pennsylvania. The airplane came to rest on the edge of the runway, and the passengers exited the aircraft via the emergency slides. There were no injuries to the passengers and crew members but the airplane was substantially damaged. The flight was operating under 14 Code of Federal Regulations Part 121 as a regularly scheduled passenger flight between PHL and Fort Lauderdale/Hollywood International Airport (FLL), Fort Lauderdale, Florida.

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 the flight crew and their pre-accident activities; company training, policies and guidance regarding threat and error management and fitness for duty; and FAA guidance on pharmaceuticals and medical conditions.

E. FACTUAL INFORMATION

1.0. Flight Crew Information

The flight crew information was documented through interviews with the flight crew and company records.

1.1. The Captain

The captain, who was the pilot flying (PF), age 61, was based at Charlotte-Douglas International Airport (CLT), and lived in Fort Lauderdale, Florida. He stated he had no major changes, good or bad, to his health, financial situation, or personal life that would have adversely impacted his performance on the day of the accident. He said he was in great shape and felt great. He had no vision or hearing problems. According to his most recent medical dated November 21, 2013, he took a number of medications daily and was approved to fly under an authorization for special issuance of a medical certificate (for additional information see section 1.1.2 of this report). In a post-accident interview, he stated he did not take any medication, prescription or nonprescription in the 72 hours before the accident that might have affected his performance on the day of the accident. He did not use tobacco products and thought he might have had a beer the night before the accident flight.

He never had any other accidents or incidents. He had received "no real 'atta-boys'." He did receive a 25 year plaque from the company. He had previous abnormals before, including an engine shutdown on the B757, but it was a long time ago and was uneventful. He did not recall when he flew with the accident first officer previously.

The accident first officer rated the captain's flying proficiency as "very good." His greatest strength was his resource management, and he fostered a good atmosphere in the cockpit and had a good attitude. She did not remember having any problems with him and could not think of an area where he could do better. She had never heard any complaints about the captain. Other first officers who recently flew with the captain said he was "kinda quiet," standard, approachable and his flying skills were "well above average." He followed company policies and procedures and ran a good cockpit. Those first officers did not feel rushed when flying with the accident captain.

1.1.1. The Captain's Pre-accident Activities

The captain was off duty March 6-12, 2014. On Monday, March 10, he woke about 0700, had a dental appointment at 0900, then rode his bike. His activities the rest of the day were normal. He went to bed about 2200-2230. He turned on the TV, then went to sleep, and slept well. He said he fell asleep really quickly.

On Tuesday, March 11, he woke up about 0630-0700. He had a doctor's appointment with his cardiologist. He was done by 1330 and then had lunch. He was not sure when he went to bed, but thought about 2230.

On Wednesday, March 12, he was "happy and relieved" because he knew the FAA would approve him for another year to fly. He did not do much that day and went to bed early because he had to be up early the next morning. He thought he went to bed about 2100-2130 and had no problems sleeping.

On Thursday, March 13, he woke up about 0445 and felt fine. He left his home for the airport at 0515 for the 25 minute drive to FLL, and caught a 0630 flight to CLT. The 2-hour flight to CLT was uneventful, and he thought he napped about 90 minutes on the flight in a good exit row seat. He arrived in CLT at 0830, and signed in for his 1035 trip at about 0930. He had a cup of coffee prior to starting the trip. The accident crew departed CLT at 1132 and arrived at Tampa International Airport (TPA) at 1312. The captain ate a meal after arriving in TPA. The crew then departed TPA at 1413 and arrived in PHL at 1649. In PHL, the accident crew changed airplanes and gates. He planned to eat a crew meal during the accident flight and had no plans after arriving at home in Fort Lauderdale that evening. The accident flight pushed back from the gate in PHL at 1752.

1.1.2. The Captain's Medical Records

The captain's FAA medical files were reviewed by the NTSB's Chief Medical Officer.

According to the FAA blue ribbon medical file, the captain was first medical certified by the FAA in 1978. He reported no medications or medical visits to the FAA until 2005, when he

reported treatment for hypertension. In 2011, the captain developed symptoms and a stress test was performed which demonstrated evidence of ischemia. Further evaluation led to coronary artery bypass surgery on February 21, 2011. After recovering, the pilot applied to the FAA for a special issuance medical certificate and a number of records were required including results from a stress test and cardiac catheterization (catheterization performed August 25, 2011). The captain was medically certified under special issuance in May 2012 and continuously thereafter.

According to his most recent medical, dated November 21, 2013, the captain reported hypertension and coronary artery disease and listed aspirin (81 mg), atorvastatin (80 mg), Lovaza (850 mg), metoprolol (50 mg), and Lisinopril (5 mg) as his daily medications. Aspirin inhibited platelets and decreased the likelihood of a heart attack. Atorvastatin (marketed under the brand name Lipitor) and Lovaza were used to treat high cholesterol. Metoprolol (marketed under the brand name Lopressor) and lisinopril (marketed under the brand name Prinvil) were used to treat high blood pressure.

In preparing for his next FAA medical exam, the pilot underwent stress echocardiography on March 7, 2014. Evidence of ischemia was identified by EKG changes and echocardiographic wall motion abnormalities that were new compared with previous exams. On the morning of March 11, 2014, the captain underwent cardiac catheterization which demonstrated significant coronary artery disease that was not amenable to further procedural intervention. According to the records, during the catheterization, the captain was given an unknown amount of midazolam and fentanyl for sedation. Midazolam was a short acting benzodiazepine that depresses the central nervous system and was used to prevent patients from recalling events during sedation for medical procedures.[2] Fentanyl was a short acting opioid analgesic commonly used to treat pain or discomfort associated with medical procedures.[3]

1.2. **The First Officer**

The first officer, who was the pilot monitoring (PM), age 62, was based at CLT, and lived in Charlotte, North Carolina. She had no major changes, good or bad, to her health, financial situation, or personal life that would have adversely affected her performance on the day of the accident. She said her health was “very good.” She wore glasses but had no issues with color vision and no issues with her hearing. She also took a daily vitamin. She did not take any medication, prescription or nonprescription in the 72 hours before the accident that might have affected her performance on the day of the accident. She did not use tobacco products and might have had a glass of wine the night before the accident. Her most recent FAA medical was dated December 5, 2013.

She had no previous accidents or incidents, and had never experienced any emergencies when flying.

She had no concerns about working for USAirways, and was looking forward to the merger. There were no pressures the day of the accident to depart PHL on time from the company or in

[2] See: Drugs.com. Midazolam Official FDA Prescribing information, side effects and uses. http://www.drugs.com/pro/midazolam-injection.html; Accessed October 29, 2014

[3] See: Drugs.com. Fentanyl Official FDA Prescribing information, side effects and uses. http://www.drugs.com/pro/fentanyl-injection.html; Accessed October, 29, 2014

her personal life. There were no issues with the flight attendants; she said "they were a great crew."

The captain who previously flew with the first officer the week before the accident stated she was very open, quiet, and easy to get along with. She was very pleasurable, competent, and meticulous with her tasks. Her flying was competent, and he thought she was a good pilot. He said she flew a standard operation; she flew how she was trained to fly. She methodically moved through her flows and procedures. They had no issues with how they operated the airplane or on a personal level.

1.2.1. The First Officer's Pre-accident Activities

The first officer was off duty March 9-12, 2014. On Monday, March 10, she did not recall when she woke up but said it was probably about 0800 because she had workers scheduled to arrive about 0900. It was a normal day and she stayed at home most of the day but may have also run some errands. She could not remember when she went to bed, but generally it was around 2230-2300. She sometimes watched TV in bed. On Tuesday, March 11, and Wednesday, March 12, she awoke and went to bed about the same times as on Monday and her activities were also the same. She felt rested each morning.

On Thursday, March 13, she woke up about 0800 and left for the airport about 0930 for the 1035 report time. It was a 20-25 minute drive to the airport. Her natural wakeup time was around 0800. She "felt rested, felt great." She flew with the accident captain from CLT to TPA, ate her lunch at the gate in TPA, and then the crew flew from TPA to PHL.

2.0. Medical and Pathological Information

The accident flight crew was tested for drugs and alcohol following the accident. The results of the post-accident drug and alcohol screening for both flight crewmembers were negative for drugs[4] and alcohol.

3.0. US Airways Training

The US Airways Flight Operations Training Manual (FOTM), chapter 1 "Introduction", subsection 1.1 "Philosophy" stated:

> *The success of US Airways depends on our ability to work as a team in achieving the following goals:*
>
> ***1.1.1 Safety.*** *To meet or exceed every safety standard. Safety is the single most important aspect of US Airways operations. Individual employees are responsible for performing their duties in accordance with established policies to ensure the highest level of safety for:*
> *—our customers and the people in our operating environment,*
> *—ourselves and our fellow employees, and*
> *—the equipment entrusted to our care.*

[4] Drugs tested for were cocaine, amphetamine, marijuana (THC), opiates, and phencyclidine (PCP).

1.1.2 Service. *To inspire in our customers a feeling of confidence by demonstrating a genuine concern for their needs. We must be continually mindful that US Airways customers expect and deserve:*
—the security provided by professional behavior and appearance,
—sensitive and respectful treatment,
—timely and accurate information, and
—a smooth flight in a clean, comfortable environment.
1.1.3 Strategy. *To establish clear goals and challenging performance standards so every employee feels personal accountability to achieve the best. We must continually focus on opportunities to maximize the use of our people, equipment, and resources in order to:*
—adapt to change,
—improve quality and efficiency, and
—gain cost and competitive advantages in our marketplace.
1.1.4 Synergy. *To cultivate an environment that optimizes cooperation and building upon each other's strengths. US Airways must sustain a work climate which:*
—is based on teamwork and mutual support,
—is open and responsive to suggestions, and
—enables the accurate and timely dissemination of information.
1.1.5 Standardization. *To conform to clearly set standards which are consistent with realistic operations. This will be achieved by:*
—maintaining consistent policies, procedures and terminology across all fleet types,
—discouraging unsafe practices, complacency, and the development of individualized procedures, and
—encouraging good judgment, professionalism, and teamwork.

3.1. **Threat and Error Management Training**

US Airways provided initial, transition, upgrade, requalificiation, recency and downbid training to crews, which included threat and error management (TEM). According to the US Airways FOTM chapter 18 "AQP and CRM[5] (Threat and Error Management)", the TEM module was "intended to fully integrate technical and CRM skills. Crews will follow CRM principles during line operations." The FOTM subsection 18.2.4 "Threat & Error Management Summary (ABCs)" summarized the tenets of TEM trained as:

Actively Monitor and Assess.
—during low workload: at least 1 pilot monitoring
—during high workload and flight path changes: both pilots monitoring. Guard against fixation
—actively Assess if what you are doing, or about to do, is sensible
—reassess whenever a threat or error is discovered
Balance Available Barriers.
—multiple barriers = layers of defense = greater margin of safety
—include everyone who can add barriers (PF, PM, ATC, Jumpseat Rider, F/A, etc.)
—time is one of your most valuable barriers

[5] Crew resource management

—to reduce task loading: increase available time (plan ahead or slow down), move non-essential tasks to a lower workload period, or delegate tasks to the other pilot and/or other resources available

Communicate Threats, Errors & Intentions.

—communicate clearly and effectively to:

• make sure everyone is "on the same page"

• raise the situational awareness of the crew to help balance available barriers

Follow SOPs.

—establishes a consistent baseline for performance

—makes it easier to identify deviations

—allows crewmembers to concentrate on issues not covered by SOPs.

4.0. US Airways Policies and Guidance

US Airways provided information to crewmembers on policies and guidance through its Flight Operations Manual (FOM).

4.1. **Fitness for Duty**

The USAirways FOM chapter 2 "Regular Operations," section 2.1 "Reporting for Duty," subsection 2.1.1 "Policy" stated the following:

Pilots will report fit for duty in full uniform with all required equipment and current manuals. See also section 13.3 Required for Flight and paragraph 13.6.1 General, Medications/Drugs.

Fitness for Duty. *Crewmembers will keep themselves physically and psychologically fit for duty. Flight crewmembers will assess their fitness for duty by taking into consideration the following:*

Flight crewmembers will not report for duty when:

- *ill,*
- *under serious mental stress, or*
- *while having a known medical deficiency that would render them unable to meet the requirements for a current medical certificate (e.g., recovering from surgery, etc.), or*
- *fatigued (see paragraph 13.7.5 Fatigue)*

4.2. **Medications/Drugs**

The USAirways FOM chapter 13 "General" subsection 13.6.1 "Medications/Drugs" stated the following:

Medications/Drugs. *Company policy prohibits the possession, manufacture, use or sale/dispensation of illegal drugs in the workplace. In addition, pilots must:*

- *not report for duty while taking any medications (prescription or over-the-counter) that can adversely effect* [sic] *performance as a required flight crewmember.*
- *inform all physicians of their flying status prior to being prescribed medication.*
- *obtain clarification of medication's effect, length of effect, or approval, from a flight surgeon if there is any doubt of its suitability for flying.*

5.0. FAA Guidance

5.1. Guidance to Medical Examiners Regarding Pharmaceuticals

The FAA provided guidance[6] to aviation medical examiners (AMEs) regarding pharmaceuticals which stated in part:

> ***GUIDE FOR AVIATION MEDICAL EXAMINERS***
>
> ***Pharmaceuticals (Therapeutic Medications)***
> ***Do Not Issue - Do Not Fly***
>
> ***Do Not Fly****. Airmen should not fly while using any of the medications in the Do Not Issue section above or using any of the medications or classes/groups of medications listed below. All of these medications below may cause sedation (drowsiness) or impair cognitive function, seriously degrading pilot performance. This impairment can occur even when the individual feels alert and is apparently functioning normally - in other words, the airman can be "unaware of impair."*
>
> *For aviation safety, airmen should not fly following the last dose of any of the medications below until a period of time has elapsed equal to:*
> - *5-times the maximum pharmacologic half-life of the medication; or*
> - *5-times the maximum hour dose interval if pharmacologic half-life information is not available. For example, there is a 30-hour wait time for a medication that is taken every 4 to 6 hours (5 times 6)*
>
> *Sleep aids. All the currently available sleep aids, both prescription and over-the-counter (OTC), can cause impairment of mental processes and reaction times, even when the individual feels fully awake.*
>
> *Wait times for currently available prescription sleep aids*
> *Diphenhydramine (e.g., Benadryl). Many OTC sleep aids contain diphenhydramine as the active ingredient. The wait time after diphenhydramine is 60 hours (based on maximum pharmacologic half-life)*
>
> *Allergy medications. Antihistamines found in many allergy and other types of medications can cause sedation and may not be used for flight. This applies to nasal formulations as well as oral.*

[6] See http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/pharm/dni_dnf/ (accessed December 29, 2014)

***Exception**: Nonsedating antihistamines (loratadine, desloratadine, and fexofenadine) may be used while flying, if symptoms are controlled without adverse side effects after an adequate initial trial period.*

***Label warnings**. Airmen should not fly while using any medication, prescription or OTC, that carries a label precaution or warning that **it may cause drowsiness or advises the user "be careful when driving a motor vehicle or operating machinery."** This applies even if label states "until you know how the medication affects you" and even if the airman has used the medication before with no apparent adverse effect. Such medications can cause impairment even when the airman feels alert and unimpaired (see "unaware of impair" above).*

***"Pre-medication" or "pre-procedure" drugs**. This includes all drugs used as an aid to outpatient surgical or dental procedures.*

***Narcotic pain relievers**. This includes but is not limited to morphine, codeine, oxycodone (Percodan; Oxycontin), and hydrocodone (Vicodin, etc.).*

***Muscle relaxants**. This includes but is not limited to carisoprodol (Soma) and cyclobenzaprine (Flexeril).*

***Over-the-counter active dietary supplements** such as Kava-Kava and Valerian.*

5.2. **14 CFR 61.53 – Prohibition on operations during medical deficiency**

Title 14 Code of Federal Regulations (CFR) 61.53 – Prohibition on operations during medical deficiency[7] stated the following:

(a) Operations that require a medical certificate. Except as provided for in paragraph (b) of this section, a person who holds a current medical certificate issued under part 67 of this chapter shall not act as pilot in command, or in any other capacity as a required pilot flight crewmember, while that person:

(1) Knows or has reason to know of any medical condition that would make the person unable to meet the requirements for the medical certificate necessary for the pilot operation; or

(2) Is taking medication or receiving other treatment for a medical condition that results in the person being unable to meet the requirements for the medical certificate necessary for the pilot operation.

(b) Operations that do not require a medical certificate. For operations provided for in Sec. 61.23(b) of this part, a person shall not act as pilot in command, or in any other capacity as a required pilot flight crewmember, while that person knows or has reason to

[7] See http://www.ecfr.gov/cgi-bin/text-idx?rgn=div8;node=14%3A2.0.1.1.2.1.1.33 (accessed January 20, 2015)

know of any medical condition that would make the person unable to operate the aircraft in a safe manner.

(c) Operations requiring a medical certificate or a U.S. driver's license. For operations provided for in Sec. 61.23(c), a person must meet the provisions of--

(1) Paragraph (a) of this section if that person holds a valid medical certificate issued under part 67 of this chapter and does not hold a current and valid U.S. driver's license.

(2) Paragraph (b) of this section if that person holds a current and valid U.S. driver's license.

5.3. **Aeronautical Information Manual**

The Aeronautical Information Manual (AIM), chapter 8 "Medical facts for pilots," section 1. "Fitness for flight,"[8] stated in part:

8-1-1. Fitness For Flight

a. Medical Certification.

1. *All pilots except those flying gliders and free air balloons must possess valid medical certificates in order to exercise the privileges of their airman certificates. The periodic medical examinations required for medical certification are conducted by designated Aviation Medical Examiners, who are physicians with a special interest in aviation safety and training in aviation medicine.*

2. *The standards for medical certification are contained in 14 CFR Part 67. Pilots who have a history of certain medical conditions described in these standards are mandatorily disqualified from flying. These medical conditions include a personality disorder manifested by overt acts, a psychosis, alcoholism, drug dependence, epilepsy, an unexplained disturbance of consciousness, myocardial infarction, angina pectoris and diabetes requiring medication for its control. Other medical conditions may be temporarily disqualifying, such as acute infections, anemia, and peptic ulcer. Pilots who do not meet medical standards may still be qualified under special issuance provisions or the exemption process. This may require that either additional medical information be provided or practical flight tests be conducted.*

3. *Student pilots should visit an Aviation Medical Examiner as soon as possible in their flight training in order to avoid unnecessary training expenses should they not meet the medical standards. For the same reason, the student pilot who plans to enter commercial aviation should apply for the highest class of medical certificate that might be necessary in the pilot's career.*

[8] See http://www.faa.gov/air_traffic/publications/atpubs/aim/aim0801.html (accessed January 8, 2015)

CAUTION-
The CFRs prohibit a pilot who possesses a current medical certificate from performing crewmember duties while the pilot has a known medical condition or increase of a known medical condition that would make the pilot unable to meet the standards for the medical certificate.

b. Illness.

1. *Even a minor illness suffered in day-to-day living can seriously degrade performance of many piloting tasks vital to safe flight. Illness can produce fever and distracting symptoms that can impair judgment, memory, alertness, and the ability to make calculations. Although symptoms from an illness may be under adequate control with a medication, the medication itself may decrease pilot performance.*

2. *The safest rule is not to fly while suffering from any illness. If this rule is considered too stringent for a particular illness, the pilot should contact an Aviation Medical Examiner for advice.*

c. Medication.

1. *Pilot performance can be seriously degraded by both prescribed and over-the-counter medications, as well as by the medical conditions for which they are taken. Many medications, such as tranquilizers, sedatives, strong pain relievers, and cough-suppressant preparations, have primary effects that may impair judgment, memory, alertness, coordination, vision, and the ability to make calculations. Others, such as antihistamines, blood pressure drugs, muscle relaxants, and agents to control diarrhea and motion sickness, have side effects that may impair the same critical functions. Any medication that depresses the nervous system, such as a sedative, tranquilizer or antihistamine, can make a pilot much more susceptible to hypoxia.*

2. *The CFRs prohibit pilots from performing crewmember duties while using any medication that affects the faculties in any way contrary to safety. The safest rule is not to fly as a crewmember while taking any medication, unless approved to do so by the FAA.*