

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

September 5, 2014

Group Chairman's Factual Report

HUMAN PERFORMANCE

DCA13FA131

A. ACCIDENT

Operator: Southwest Airlines (SWA)
Location: La Guardia Airport, (LGA), Flushing, New York
Date: July 22, 2013
Time: 1740 eastern daylight time (edt)¹
Airplane: Boeing 737-700
Registration: N753SW

B. OPERATIONS/HUMAN PERFORMANCE GROUP

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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 July 22, 2013, about 1740 edt, N753SW, Boeing 737-700, operated by Southwest Airlines as flight 345, landed hard and sustained a collapsed nose gear on runway 04 at LaGuardia Airport (LGA), Flushing, New York. Visual meteorological conditions prevailed at the time and an instrument flight plan was filed. Of the 145 passengers and 5 crewmembers, there were 9 minor injuries. The airplane was substantially damaged and there was no fire. The flight was operating under the provisions of 14 Code of Federal Regulations Part 121 as a regularly scheduled passenger flight from Nashville International Airport (BNA), Nashville, Tennessee.

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 flightcrew, their pre-accident activities; and company training, policies and guidance regarding crew coordination and use of automation.

E. FACTUAL INFORMATION

1.0. Flight Crew Information

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

1.1. The Captain

The captain, who was the pilot monitoring (PM) for most of the flight to LGA, age 49, was based at Oakland (OAK), and lived in Sacramento, California. 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. She did not use tobacco products and thought she last had an alcoholic beverage 3-4 days before the accident flight.

She liked working for SWA and there were no external pressures from the company to fly or continue a flight if she was not comfortable. She did not have any concerns about working for SWA or flying the B737.

Pilots who recently flew with the captain said she followed company procedures and checklists. One pilot described her as “very personable,” competent and knowledgeable about the airplane. Another pilot described her as an average pilot. Pilots’ descriptions of her crew resource management (CRM) skills varied from excellent to average, and one FO said at times there was no distinct command ability and the captain would not provide input to decisions the FO was making. The accident FO said her CRM depended on the phase of flight. At altitude during the approach briefing, her CRM was excellent. However, during the descent profile, he got the feeling there was a way she liked to do it and at one time she was coaching him on how to do his descent.³

1.1.1. The Captain’s Personnel Issues

The OAK chief pilot stated that there were a few passdown files⁴ relating to the accident captain from late 2009, and some from January and February 2010. There were no files pertaining to the accident captain after 2010. The passdown file included a memo with a summary of observations of male and female first officers (FOs) regarding the accident captain. These included the following:

- “Four stripe syndrome”
- “Attitude/personality”
- “Does not solicit input from FO or allow FO in the decision process”
- “Not setting tone/Poor Flt Deck environment”
- “Insecure in abilities/leadership”
- “Great w/Flight Attendants but CRM on Flt Deck not there”
- “Need to understand team concept/she makes all the decisions”
- “Hung up on Woman in Aviation and women lib discussion”
- “Flys [sic] the aircraft for the FO”
- “Doesn’t like to be questioned or challenged”
- “Harsh approach/coughs orders/snaps response”
- “Communication lacking”

The chief pilot met with the accident captain in January 2010 to discuss the observations from FOs. The passdown file created by the chief pilot following the meeting stated that during the meeting she was initially defensive and argued each point. For example, he discussed with her an event in which she had briefed a single-engine return back to MDW, but the first officer had suggested ORD because the OPC would not allow a flaps 15 landing with wet-good braking at MDW; and her response to the first officer was “ok, if you want to go land in that mess.” When the chief pilot shared that scenario with the accident captain, she said the FO was an “a**hole from day one, and was always challenging her.” The chief pilot further wrote in the passdown

³ When the accident FO was asked by the captain of his previous trip about his next trip, the FO said that he was flying with the accident captain, and the previous captain responded “oh boy.” The accident FO did not ask him to expand on what that meant.

⁴ The OAK chief pilot stated during an interview that a “passdown file” was an inter-office memo that was used at the Oakland domicile to document personal or professional personnel issues. He was not aware if other SWA crew domiciles used passdown files. The files were essentially used to keep the office informed of any issues that would have to be dealt with. The passdown files were archived on a computer drive.

file that his impression was that the captain was insecure in the left seat and regarded input from the FO as a challenge to her authority, felt threatened, and responded defensively.

Based on the complaints from FOs who had flown with the captain, the chief pilot recommended that she attend refresher CRM and leadership training. The training was a one-on-one 4-hour classroom session taught by a CRM instructor on February 3, 2010. Email communication between the CRM instructor and chief pilot after the completion of the training stated that the topics covered were – “(1) setting the tone with introductions and briefings, (2) the differences in perception and reality and how to handle it with questions, (3) respectful assertion and the Golden Rule, (4) attacking problems not people and stating facts instead of personal attacks, (5) how to have a positive attitude, and (6) approaching each flight with safety first.” The CRM instructor further wrote that the captain was open to the training and the instructor felt that she would try to incorporate the tools they discussed while flying. A follow up conversation between the chief pilot and the captain about a week after the training indicated she was pleased with the training. The chief pilot also stated that an FO that had previously flown with the accident captain told him that she was much improved after the training. The CRM instructor contacted the captain about a month after the training and the captain felt that things were going well with the FOs she flew with. The chief pilot had received no repeat complaints regarding the accident captain since the training.⁵

1.1.2. The Captain’s Pre-accident Activities⁶

On Friday, July 19, 2013, the captain was off duty and likely awoke around 0700-0730. She was at home, had breakfast and coffee, and left about 0900 to work out. She was heading home about 1100. She had lunch and did activities on the computer. She usually ran errands on Friday afternoons and attended to personal matters around 1500. She was back at home early and thought she got in bed about 2000, read a book, and fell asleep about 2230. She usually slept very well. According to cellular telephone records she received several inbound text messages between 0800 and 1330 and she made only one phone call at 1708; there were no outbound text messages.

On Saturday, July 20, the captain was off duty and reported waking up about 0800. She did some gardening on her patio before having breakfast; and thought she ran errands in the afternoon. She stated that the next morning was an early show time, and when she had an early show the next

⁵ SWA had an avoidance bid system, which was mandated by the collective bargaining agreement between SWA and the Southwest Airlines Pilots Association and similar to systems operated by other airlines, that allowed first officers to designate up to three captains that they did not want to be paired with for their monthly bid sequence of trips. If the system paired a first officer with one of his avoided captains, it would remove the first officer from that trip and give him another trip. A first officer would only enter the employee number into the system and it did not request a reason be given for avoiding a captain. This system was not actively monitored by SWA and data was accessed only with approval by the vice president of flight operations. In 2009, the captain had an average of 4.8 avoidance bids against her each month (ranging from 4 to 6 each month). During that same year, 15.9% of the 353 OAK-based captains had one or more avoidance bids and the average of those captains was 3.1 bids per month. In the 12 months preceding the accident, the average number of avoidance bids against the captain was 6.9 (ranging from 5 to 9 each month). During that same time period, 15% of the 367 OAK-based captains had one or more avoidance bids and the average of those captains was 2.8 bids per month.

⁶ The captain did not remember her specific activities in the days preceding the accident, but said that she had a typical routine and based her recollection on that. All times are Pacific daylight time (pdt) unless otherwise noted.

morning she liked to be home before 1700 and was usually in bed by 2100 and was asleep near that time. Cellular telephone records indicated only two phone calls were received at 1313 and 1415; no text messages were sent or received.

On Sunday, July 21, she thought her alarm was set for 0315 and at 0400 she began her hour and twenty minute drive to Oakland to make the 0605 show time. She was generally most restless when she had to wake early for a flight due to the anticipation of going to work and making sure she awoke in time. She felt fine when she woke up. The duty day was typical. She flew from OAK to San Diego (SAN), SAN to Phoenix (PHX) and PHX to Los Angeles (LAX). She was at her hotel in LAX about 1430. She rested in bed but did not sleep. It was a long day because of the weather in PHX. She worked out, had dinner and read until she went to sleep about 2100. Cellular telephone records indicated a number of inbound text messages were received between 0631 and 1340; no outbound text messages were sent and no phone calls were made or received.

On Monday, July 22, she thought she awoke about 0415 and left on the 0500 bus to the airport from the hotel for the 0545 report time. She had slept well and felt fine that morning. She went to the airport early to get breakfast and coffee. She departed with the accident FO from LAX at 0613 and flew to BNA arriving at 1212 cdt. The crew departed BNA at 1433 cdt for LGA, where the accident occurred. In Nashville she felt like it was a long day but felt OK to fly. There was no cellular telephone activity on July 22.

1.2. The First Officer

The FO, who was the pilot flying (PF) for most of the flight, age 46, was based at OAK, and lived in Brainerd, Minnesota. He had no major changes, good or bad, to his health, financial situation, or personal life that would have impacted his performance on the day of the accident. He did not use tobacco products and last had an alcoholic beverage about 10 days before the accident.

When he was not working and was at home, he usually went to bed about 2245. During the school year he would wake about 0600 and after the school year he would wake around 0700. He averaged 6-7 hours of sleep per night and generally woke feeling rested. When he was scheduled to return to work, he commuted to OAK the day prior to a trip, where he would stay at a hotel at his own expense.

He loved working for SWA and did not feel any external pressures to continue a flight. A pilot who previously flew with the FO and the accident captain stated he had good CRM and he followed company procedures and checklists. Both pilots had no issues with his flying abilities which were “on par” with other first officers. He received multiple air medals and meritorious service medals in the USAF and received an “atta boy” at SWA the previous Fall for helping a passenger needing assistance boarding and deplaning.

1.2.1. The First Officer’s Pre-accident Activities⁷

⁷ All times in this section are pdt unless otherwise noted.

The FO was off duty July 16-18, 2013. On Thursday, July 18, the FO traveled Oakland, CA, arriving about 2100. He took the BART to the crew hotel where he spent the night. Cellular telephone activity ended at 2145.

On Friday, July 19, 2013, the FO thought he awoke about 0700, went to the gym, and had breakfast. He had a report time of 1230 for an afternoon pairing with another captain. He did not take a nap, but he felt OK. He was scheduled on a 2-day trip. He flew three legs ending with a 2239 cdt arrival in Minneapolis (MSP) where they overnighted. He went to the hotel but did not go out to eat because it was late. He ate out of his “food bag” and went to bed between 2300 and 0000 cdt. His said his food bag typically had sandwiches, yogurt, fresh fruit and “grandma’s banana bread.” He had no problems sleeping. Cellular telephone activity consisted of multiple telephone calls and an inbound text message from 0750 until 1106. There was no other cellular activity that day.

On Saturday, July 20, he awoke between 0800 and 0900. He went to the gym, had breakfast and went shopping around 1000 cdt for about 2 hours. He wanted to be back to his hotel before 1300 cdt to prepare for work. He hung out in his room, got ready and met the captain in the lobby. They reported at 1505 and were scheduled to deadhead to Chicago-Midway (MDW) then fly from MDW to OAK. They pushed about 1 hour late from MDW, and the flight to OAK was uneventful, arriving at 2102. He arrived at the crew hotel about 2200, and went to sleep between 2300 and 0000. He had no problems sleeping. Cellular telephone activity began with multiple telephone calls starting at 1114 cdt and ended about 2304.

On Sunday, July 21, He thought he awoke between 0800 and 0900. He had breakfast and waited to work out until the evening when the next hotel would have a nicer gym. He was scheduled to deadhead from OAK to LAX. His report time was about 1140 and the flight departed at 1301. The flight was a little delayed from Oakland to LAX and arrived at 1411. He was awake throughout the flight. He walked to the hotel and took about an hour nap around 1500 or 1600. He went to the gym about 2000, ate dinner out of his food bag, and cooled down. He called his wife about 2200 He showered and got ready for bed and was asleep between 2300 and 2330. He had no problems sleeping. Cellular telephone activity consisted of multiple telephone calls that began about 0748 and ended about 2248.

On Monday, July 22, he awoke about 0500, walked to the airport around 0525 and arrived by 0540. He went through security and was at the gate by the report time of 0545. There was nothing of concern to him. He felt well rested. He flew with the accident captain from LAX to BNA and recalled that the flight time was scheduled for 4:10, and they arrived a little early. They were scheduled on the ground for about 1 hour and 30 minutes but had an extra hour delay, because the accident airplane was late arriving at BNA. Cellular telephone activity began about 1004.⁸

2.0. Medical and Pathological Information

⁸ Cellular telephone records indicated an inbound text message at 0755 pdt and a call that was routed to voicemail at 0853 pdt, but there was no outbound response.

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 drug and alcohol.

3.0. SWA Training

3.1. Categories of training

According to the SWA Flight Operations Training Manual (FOTM) there were seven basic categories of training – initial, transition, upgrade, differences, special, recurrent and requalification training. SWA trained pilots using multiple methods of instruction – classroom ground training, self-paced home study, flight simulation training devices (FSTDs), and line oriented flight training.

The accident flight crew received initial, upgrade, special and/or recurrent training at SWA. Those training categories can be described as follows:

- (1) Initial training was provided to new hires to SWA or SWA personnel who had not previously held a flight crewmember position at the company. Training included ground training and flight training. Crew resource management was covered during ground training general operational subjects and included a background of CRM, effective communication, threat identification, risk assessment, and managing errors. New hires also completed a proficiency check, line oriented flight training, and operating experience.
- (2) Upgrade training was provided to flight crewmembers trained and qualified as second in command on an aircraft type who were being assigned as pilot in command on the same aircraft type. Training included ground training, flight training, a proficiency check, line oriented flight training, operating experience, and captain leadership ground training. CRM was included in ground training general operational subjects training and included a background of CRM, effective communication, threat identification, risk assessment, and managing errors. Included in operating experience was head-up guidance system operating experience. Captain leadership training was provided to PICs who were eligible for their first recurrent training following completion of upgrade to PIC with the purpose of enhancing the leadership qualities of the PIC. The accident captain completed leadership ground school training on January 4, 2008.
- (3) Special training was training required for all flight crewmembers at any stage of training or qualification, such as when service begins at a new airport deemed “special” by FAR 121.445. The accident captain and first officer’s most recent completion of special training was for “Oceanic Procedures and Class II Navigation Ground Training” on January 15, 2013, and December 14, 2012, respectively.
- (4) Recurrent training was provided to flight crewmembers trained and qualified on an aircraft type who will continue to serve in the same duty position and aircraft type to maintain currency. Training for PICs included classroom ground training, online ground training, home study examination, proficiency training, a proficiency check, and a line check. SICs received classroom ground training, online ground training, home study examination, and either proficiency training or a proficiency check.⁹ In 2012, classroom

⁹ Recurrent training for SICs included a proficiency check one year and proficiency training the next year.

ground training covered a general review of crewmember duties and responsibilities and CRM/risk and resource management principles (RRM) and practical applications as a part of general operational subjects. These topics were not listed in the 2013 recurrent curriculum segments outlined in the FOTM.

SWA also provided additional training to flight crewmembers who received an incomplete, unsatisfactory or extra training event during training. The accident captain completed additional training during her initial operating experience on November 30, 2000.

3.2. Crew resource management training and risk and resource management

The principles of crew resource management (CRM) were emphasized throughout training, particularly crew communication. Pilots are encouraged to question each other when situations of uncertainty appear to be developing. SWA pilots are trained to utilize the RRM model. Resources available to the pilots to mitigate risks are policies, procedures and flows; checklists; automation; briefings and external resources; and knowledge, skills and techniques. To help improve risk management, pilots are trained to continuously follow “ABCD” – Assess your potential for error/are you in the green, yellow, or red zone¹⁰; Balance what you need to do and use of resources to minimize risk; Communicate risks and intentions, and ask for information from those who do know; and Do actions and Debrief to improve future performance. Factors trained that could increase the potential for errors included task loading (time required vs. time available), additive conditions (risk elements that compete for the crew’s attention) and crew factors (factors that impact the capabilities of the individual or crew). In upgrade training, captains were taught additional countermeasures to combat error and to get back in the green zone – team climate (leadership, communication environment and flight attendant briefing), planning (SOP briefings, plans stated, workload assignment, and contingency management), execution (monitor/cross check, workload management, vigilance, and automation management) and review and modify (evaluation of plans, inquiry, and assertiveness).

4.0. SWA Policies and Guidance

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

4.1. Standardization and Coordination

The SWA FOM chapter 2 “Philosophy” section 2.2.5 “Standardization and Coordination” stated the following:

Standardization and coordination are essential keys to safe and efficient operation of Southwest Airlines aircraft. Captains are expected to demonstrate disciplined use of standard procedures and ensure First Officers understand and use standard procedures. Captains are responsible for decisions affecting the conduct of their flight; however, they should use all

¹⁰ The green zone was trained as one in which the crew catches errors before they become consequential, there was good situational awareness, and resources were in place to catch possible errors. The yellow zone was trained as one in which there was a higher chance of errors, situational awareness could be decreasing, and resources were not in place to catch errors. The red zone was trained as one in which there was a very high chance of serious error, stress may be high and tunnel vision may occur, and resources were not effective to catch error.

available resources to assist them in making operational decisions. Southwest Airlines aircraft are not designed as single Pilot aircraft and should not be flown as if they are.

Southwest Airlines First Officers have all previously been Captains and therefore should be treated as experienced Pilots who are in training to be Captains at Southwest Airlines. First Officers are expected to remain vigilant and alert to ensure that the Captain has not overlooked anything of importance. Both Flight Deck Crew Members should consistently support each other in every phase of flight.

Successful coordination depends on the sum of two intangibles: judgment and the ability of the Flight Deck Crew to adjust to the many varied personalities with whom they are required to fly. The duties, or specific acts required for each Flight Deck Crew Member, may be definable. However, without smoothly functioning team precision, these varied duties can become elements of a confused situation, which can lead to adverse consequences.

In a two-Pilot flight deck, change of aircraft control must be absolutely positive. There can be no doubt about who is flying the aircraft. Therefore, when aircraft control is transferred between the Captain and First Officer it must always be done with a statement that is acknowledged by the other Pilot (e.g., ‘You have the aircraft.’ ‘I have the aircraft’).

4.2. Flight Deck Discipline

The SWA FOM chapter 3 “Flight Deck Operations General,” section 3.3 “Flight Deck Discipline,” subsection 3.3.2 “Flight Deck Crew Member at Controls” stated the following:

The following guidelines apply to Flight Deck Crew Members at controls:

During takeoff and prior to final approach, the PM should have feet and hands in a position to immediately assume full control of the aircraft if circumstances warrant.

- At lower altitudes, while the aircraft is operating with the autopilot engaged, the PF should have his hands and feet guarding the controls.

NOTE: “At lower altitudes” should be interpreted to include the first few minutes of flight with the autopilot engaged after takeoff and any time the flaps are extended for maneuvering, approach, or landing.

4.3. Automation Policy

The SWA FOM chapter 4 “Flight Management/Navigation,” section 4.1 “Automation Policy,” subsection 4.1.3 “Levels of Automation” stated the following:

Levels of automation listed below organize the guidance sources available to the Pilot from highest to lowest and provide a structure of priorities. Lateral and vertical guidance modes are independent of each other and can be engaged at different levels. For example, using LNAV (FMC level) and VERTICAL SPEED (MCP level) may be the most appropriate combination for a particular phase of flight.

Mode Control Panel Level

Lateral, vertical, and speed guidance are controlled through the Mode Control Panel (MCP). The MCP level is used for short-term flight path guidance, such as when being radar vectored in the terminal environment.

4.4. Automation Management

The SWA FOM chapter 4 “Flight Management/Navigation,” section 4.2 “Automation Management” stated the following:

The PF maintains responsibility for the aircraft flight path and speed; this responsibility is never delegated to an automatic system.

The PF chooses the most appropriate automation and flight director guidance for the task. This includes reverting from FMC guidance and selecting more appropriate lateral and vertical modes from the MCP, or reverting to hand-flying for direct control of the aircraft flight path and thrust.

When making autoflight systems inputs:

- **Verbalize**—Announce MCP mode changes and FMC inputs.
- **Verify**—Confirm these inputs and the appropriate mode annunciation.
- **Monitor**—Monitor mode annunciations, expected aircraft performance, and compliance with ATC clearances.
- **Intervene**—If the actual aircraft performance or automation mode differs from intended/expected, resolve the difference and ensure compliance with ATC clearances.

Refer to the respective *AOM* for specific automation change procedures and associated callouts.