Docket No. SA-542

Exhibit No. 2-B

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Operational Factors Group Chairman's Factual Report
Attachment 1 – Interview Summaries

(8 Pages)

Factual Report – Attachment 1

Interview Summaries

OPERATIONAL FACTORS

DCA18MA142

Interviewee: Darren Lee Ellisor, First Officer, Southwest Airlines
Representative: Stephen Walsh, Condon and Forsyth LLP

Date / Time: April 18, 2018 / 1450 EDT
Location: Marriott Hotel, Philadelphia Airport, Philadelphia, Pennsylvania
Present: Michael Spencer, Federal Aviation Administration (FAA); Gregory Bowen, Southwest Airlines Pilots Association (SWAPA); Kevin Fergerson, Southwest Airlines.
Investigator: Marvin Frantz, National Transportation Safety Board (NTSB)

In the interview, First Officer Ellisor stated the following:

He was 44 years of age and had been employed by Southwest Airlines for 10 years and 2 months at the time of the accident. He has served as a Boeing 737 First Officer for all of his time at Southwest Airlines. His current crew domicile is Houston, Texas.

Prior to Southwest Airlines, he began his Aviation Career at the United States Air Force Academy, Colorado Springs, Colorado. He served 10 years active duty and has flown the T37, T1 and E-3 AWACS Aircraft. After leaving the Air Force he was hired by Southwest Airlines.

Prior to the accident flight he had never flown with Captain Shults.

The crew began their 4 day trip on April 16th, 2018 at Houston Hobby Airport, Houston, Texas. They reported for duty at 0730 CDT[1].

First Officer Ellisor stated that he went to bed at approximately 2130 CDT Sunday night and commented that he slept well and was "rested" when he reported for duty.

On Monday April 16th, they flew from Houston (HOU) to Northwest Regional Airport, Panama City, Florida (ECP), and continued on to New York LaGuardia Airport (LGA), then on to Nashville International Airport, Nashville Tennessee (BNA).

They ended their duty day in Nashville at 2017 CDT.

The First Officer stated he arrived at the hotel and proceeded directly to his room and went to bed shortly after 2100 CDT.

On Tuesday, the day of the accident he awoke at 0500 CDT and reported for duty in Nashville at 0600 CDT.

The Crew departed Nashville (BNA) and proceeded to LGA. He stated he noted nothing abnormal with the aircraft during this flight.

[1] central daylight time

He stated they left the gate in New York a few minutes early and experienced no delays taxiing to runway 31 for takeoff. First Officer Ellisor was the Pilot Flying. The takeoff and initial climb was normal. He stated air traffic was unusually light, and no turbulence or adverse weather was present. He could not remember if they had used engine anti-ice or not during any portion of the climb. During climb shortly after passing 32,000 feet climbing towards 38,000 feet he heard a loud bang while simultaneously experiencing extreme airframe vibration and significant "left" aircraft yaw, and a rapid depressurization. He stated there were lots of horns going off. He donned his oxygen mask, initially having difficulty establishing communications with Captain Shults as well as ATC, referencing the loud noises in the cockpit. He noted there was fog momentarily in the cockpit as well as dust. He disconnected the autopilot and autothrottles, then pulled engine 2 thrust lever to idle and began a descent. He sensed the aircraft descending "on its own". He selected the overhead speaker on his audio panel and stated he was then able to communicate. He began diagnosing the aircraft and determined there was N1 rotation from the number 1 engine. Captain Shults assumed pilot flying duties and First Officer Ellisor began the Engine Severe damage checklist. He noted the Captain initially thought there was a fire due to smell and fog. He found no fire indication, observed fire handle not lit, performed fire system test. The test was good. He then started the APU. During the descent he attempted to call the flight attendants 2 times and received no answer. The cabin may have tried to call earlier; but they were busy. ATC asked them where they wanted to land. He looked at his map and determined Philadelphia International Airport was a close suitable airport and pointed it out to the Captain. The captain told ATC they wanted PHL.

At 10,000 feet they removed their oxygen masks noting as the aircraft slowed it became quieter in the cockpit which improved communication. At this time he attempted contact and was successful in establishing communication with the flight attendants. He thinks it was the "A" Flight Attendant that answered who informed him that a window blew out and there was someone outside the aircraft. They had planned a 20-mile final in order to accomplish checklists, but based on this information they made a decision to expedite their landing in Philadelphia. The aircraft was handling sluggishly. The Captain stated that she was going to land Flaps 5 based on her assessment that as the aircraft slowed it was not responding well. He stated the Captain made a great landing on runway 27 Left at Philadelphia International Airport. After landing they exited Runway 27 Left and exited the runway on the high-speed taxiway next to the fire trucks. He shut engine 2 down and asked the people to remain seated. He discussed with the Captain about placing the flaps at 40 in case of an eventual evacuation, which he did. The Captain left the cockpit and he finished the shutdown checklist, leaving the APU running.

He stated they had difficulty communicating with the Fire Trucks on the radio and said the Captain requested a discreet frequency. He eventually yelled to the fire chief from the forward entry door. The Fire chief re-directed him to the forward service door where the EMT's entered the aircraft via a ladder.

The EMT who entered the aircraft returned to the aircraft door and requested additional assistance and medical equipment to be brought onboard the aircraft. He stayed on the flight deck and does not recall how long they treated the patient before removing her from the aircraft. He was not aware of anyone else needing medical attention. About 10 minutes after they removed the injured passenger, air-stairs arrived and the remaining passengers deplaned.

The fire chief and the Captain addressed the passengers about deplaning. The evacuation of the aircraft was orderly. Afterwords the aircraft was turned over to Southwest Maintenance. Maintenance asked him to pull the number one engine fire handle. He informed them it was already pulled.

Contributing to the initial comm issues with the oxygen masks was: Lots of noise, hard to talk with positive oxygen flow, startle factor, temporary loss of situational awareness.

ATC asked where we wanted to go. The Captain requested vectors to the nearest airport, but suggested PHL, and the Captain said good. The descent profile worked out great.

Events that happened at once: obvious explosive decompression, trying to descend as fast as possible without making vibration worse, Pulled BOTH throttles to idle.

He said 7-10 minutes elapsed before he was able to establish communications with the flight attendants.

Prior to the event he noticed nothing odd with the aircraft. He guessed it was about 3 minutes after the event that he initiated the severe damage checklist. The transfer of controls to the Captain occurred about 2 minutes after the event.

They used the normal Landing Checklist. This was the only checklist, other than the severe damage checklist, that they accomplished.

This was nothing like any engine failure ever experienced in training due to: control issues, not certain how slow they could go, shallow glide path due to Flaps 5 landing. The Captain used the HUD in VMC mode.

They used number 2 engine reverse to aid in stopping, brakes and nose wheel steering worked normally.

Saturday two days prior to the trip sequence he slept normally and experienced no fatigue issues prior to or during the trip sequence. He has called in previously for fatigue.

Not sure if he was on or off the oxygen mask while communicating with the flight attendants. He does not remember if the hot mic interphone was active or not. Headset in use was a Bose A20 with working batteries.

He said their approach speed was Vref15 plus 20 kts.

He utilized the Southwest Risk and Resource Management Model. He was constantly assessing.

The leg before the accident was flown in the accident aircraft.

There was a quick fog during the explosive decompression. It took his breath away. It was the most memorable few seconds of his aviation career.

They did not prepare for evacuation once they realized there was no fire.

He stated the checklists worked. His hands were full trying to accomplish number one (of the 4 items on the Southwest Airlines non-normal procedures MATM list.) (Number one is *in all situations, maintain aircraft control*.) He had done a rapid decompression in training, wearing the mask to a landing.

The first time a flight attendant answered a call from the flight deck, she didn't hear anything, so she hung up.

For one of the calls to the cabin, he did not know if his mask was on or not.

The Captain made a PA to let them know there was an engine malfunction but everything was OK and they were going to Philadelphia. The flight attendants did not hear the PA.

It was optional to use the speaker with mask on. He was sure his boom mask switch was in the mask position. The Captain thought her switch was in the mask position. He heard the Captain on the speaker. He put his headset back on during the descent.

He had no specific suggestions to Southwest Flight Operations Training about extra training. It can be counterproductive to train compound emergencies. They were so rare.

The interview ended at 1605 EDT.

Interviewee: Tammie Jo Shults, Captain, Southwest Airlines
Representative: Anthony U. Battista, Condon and Forsyth LLP

Date / Time: April 18, 2018 / 1615 EDT
Location: Marriott Hotel, Philadelphia Airport, Philadelphia, Pennsylvania
Present: Michael Spencer, Federal Aviation Administration (FAA); Gregory Bowen, Southwest Airlines Pilots Association (SWAPA); Kevin Fergerson, Southwest Airlines.
Investigator: Marvin Frantz, National Transportation Safety Board (NTSB)

In the interview Captain Shults stated the following:

She was 56 years old. She had been pilot for Southwest Airlines for 24 years. She had flown with Southwest as a First Officer until 2000, when she upgraded to captain. She had held no other positions with Southwest. She had a B-737 type rating. She was based in Houston, Texas.

She had entered the Navy in 1985 and gone through the jet pipeline. She had flown A-7s and F-18s in the Navy. After she left the Navy, she flew forest fire support for one summer before

joining Southwest. She had about 13000 hours flight time in the B-737, and roughly 2000 hours in other aircraft.

On the day of the accident, she departed from runway 31 at LaGuardia Airport in New York early (based on their scheduled time). The flight had a full passenger load, and carried 26,000 pounds of fuel. The flight had been cleared by ATC to 38,000 feet. The First Officer was the pilot flying (PF). During the climb, there was a sudden explosion, aircraft yaw, lights and whistles, and a gray puff of smoke. She thought at first the smoke might be from a fire, but it did not have an exhaust smell. The airplane started down immediately. She realized that Philadelphia was the best choice for landing. Number one engine obviously had severe damage. The flight was about 50 miles from PHL. She took control of the airplane from the First Officer during descent. The First Officer ran the engine severe damage checklist as they descended. He tried to contact the flight attendants, but could not establish communications through the cabin interphone system. As they continued descent, she had a discussion with the First Officer about damage to the hydraulic system. She was experiencing lots of drag on the flight controls. She decided to request a long final to allow time to accomplish other checklists, but when they learned of a passenger who was outside the airplane and injured, she decided to expedite her approach. She decided to use flaps five for landing. She got off the runway using a high-speed taxiway. After they had stopped, airport rescue personnel put a ladder up to the airplane on the Captain's side. Then they moved it to the other side. An EMS trained passenger was doing CPR on the injured passenger. Then a paramedic from airport emergency services came aboard and took over. The distressed passenger was then removed from the airplane by the emergency services personnel. The remaining passengers then deplaned using air-stairs which had been brought to the plane. The flight attendants were very professional and it was a very orderly exit from the plane.

All the events occurred nearly simultaneously. She stated, "you've still got it" when the events first occurred. She made a PA to the cabin. She was wearing the oxygen mask, so communication was cumbersome. The First Officer put his mask on first, then the Captain. The masks were removed when the airplane reached 10,000 feet. She had called for the engine severe damage checklist. She flew the airplane and handled communications and the First Officer set up the navigation and dealt with the cabin. She had planned a longer final but the injury led them to expedite. She had no sense of time. The noise in the airplane may have impacted communications. Her mask microphone switch wasn't "on" initially. The First Officer had later selected the overhead speaker "on" and positioned her mask microphone switch correctly. She was not sure of the time frame before communications got fixed, but stated "it was not very long."

The First Officer had begun the descent and she took over airplane controls at maybe 25,000 feet. She stated she could not fly at Vmo/Mmo during the descent because of airplane shudder. She slowed to lessen the vibration.

She asked ATC to divert for the emergency, and they asked her where she wanted to go. They decided on PHL. There was only one exchange of controls, when she took over from the First Officer during the descent.

She made a PA to the cabin. After the event, a flight attendant told her that almost all of the PA was not heard. Only the mention of the destination, Philadelphia, was heard in the cabin. She thought the first attempt at communication between the flight deck and the cabin was made by the cabin. The first successful contact was by the First Officer. A flight attendant gave him a report but it did not include mention of a missing window or injured passenger. By the time the airplane reached 10,000 feet, they were aware of the injured passenger.

After they landed before exiting the airplane, she had stowed her oxygen mask back in its compartment. She thinks the mask for the jumpseat immediately behind her seat probably came out of its fixture due to vibration and airplane maneuvering during the event.

There was no indication of any problem prior to the event. She thought the hydraulic A system was not working because the flight controls were so heavy. She did not check for any hydraulic system caution lights. Besides the engine severe damage checklist, the only other checklist they completed was the before landing checklist. They were in VMC from the onset of the event until landing. During the single-engine approach, she experienced a lot more drag than in training. There was also significant yaw.

After stopping on the taxiway, by the airport emergency vehicles, she tried to get a frequency to use to talk to the rescue personnel. Then she left the flight deck and began walking down the cabin aisle row by row, checking on the condition of the passengers. The two passenger who had pulled the injured passenger out of the window were up front in the cabin. She left the flight deck about 15 seconds after stopping to check on the passengers and ensure an orderly de-planning.

The First Officer later confirmed the hydraulic problem by checking the fluid quantity.

She used the HUD (heads up display) in the VMC mode during the approach with a three-degree glideslope.

She uses a David Clark on-the ear headset.

She thought the noise subsided when they had slowed to 280 knots. During the event she kept going back to the number one item in Southwest MATM non-normal procedures (1: Maintain aircraft control, 2: Analyze the problem, 3: Take appropriate action, 4: Maintain situational awareness) because it was a complex emergency. She thought her training was very good. She would not recommend any checklists or procedures changes. Her last engine-failure event in training was in June of 2017. She could not remember if it was an engine severe-damage event.

They made a left turn to Philadelphia.

On the Saturday before the accident flight, she was off-duty, and woke up about 0800 CDT. She went to bed that night at midnight. On Sunday, she woke up at 0800, went to church, and left early to commute to Houston for her flight on Monday morning. Sunday night she went to bed at 2045 CDT. Monday morning she woke up at 0500 CDT for a report time of 0730 CDT. Monday was a 12-hour duty day due to delays. She was at the hotel and in bed by 2130 CDT Monday

night. Tuesday (the day of the accident) she woke up at 0500 CDT, and did not feel fatigued at all when she reported for duty. She had no health issues which affected her performance.

During the descent, she determined no evacuation was needed after she confirmed there was not a fire. This was through the lack of fire warning lights and contact with the cabin.

She was aware that it would be an overweight landing, but considered the time and costs of the inspections required (after an overweight landing) to be minimal compared to the urgency of landing immediately.

In comparing the actual event to her training in the simulator, she stated that in the sim, the plane was not as heavy, the engine was slick and the rudder in the sim worked great. Normally she did not train a hydraulic failure along with an engine failure.

She commuted to work from San Antonio, Texas. She remembered calling in fatigued once.
For an approach speed, she referred to the approach reference page of the FMC[2] for flaps 15, and added twenty knots. This came to 180 knots.

The interview ended at 1715 EDT.

[2] Flight Management Computer