NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

October 13, 2020

Group Chairmen's Factual Report

OPERATIONAL FACTORS/HUMAN PERFORMANCE

DCA20MA002

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A. ACCIDENT

Operator:	Peninsula Aviation Services, INC d/b/a PenAir
Location:	Unalaska, Alaska
Date:	October 17, 2019
Time:	1740 Alaska daylight time (ADT[1])
Airplane:	Saab 2000, N686PA

B. OPERATIONAL FACTORS/HUMAN PERFORMANCE GROUP

Marvin Frantz – Co-Chairman
Operational Factors Division (AS-30)
National Transportation Safety Board

Sathya Silva, PhD – Co-Chairman
Human Performance Division (AS-60)
National Transportation Safety Board

Dujuan Sevillian, PhD – Member
Human Performance Division (AS-60)
National Transportation Safety Board

Captain Brandon Wilson – Member
Line-check airman, Saab 2000
Peninsula Aviation Services

Roger Young – Member
Aviation Safety Inspector
Denali Certificate Management Office
Federal Aviation Administration[2]

Captain Dennis Fisher
Line-check airman, Saab 2000
Peninsula Aviation Services[3]

C. SUMMARY

On October 17, 2019, about 1740 Alaska daylight time, Peninsula Aviation Services Inc. d.b.a. PenAir flight 3296, a Saab 2000, N686PA, was landing at Unalaska Airport (DUT), Unalaska, Alaska, when the airplane overran the end of the runway, passed through the airport perimeter fence, crossed a road, and pitched down over shoreline rocks with its nosewheel in Dutch Harbor. Two flight crewmembers, one flight attendant, and 39 passengers were aboard the airplane; one passenger sustained fatal injuries. The airplane was substantially damaged. The airplane was operating as a regularly scheduled passenger flight under the provisions of Title 14 *Code of Federal Regulations* (*CFR*) Part 121. Visual meteorological conditions prevailed at the time of the

[1] All times in the report are ADT unless noted otherwise.
[2] Other FAA personnel served as group members for certain interviews: Tony Fischer, FAA Aviation Safety Inspector, served as the group member for several of the PenAir personnel interviews conducted the week of 2-6 December 2019, and David Keenan, FAA Air Safety Investigator, served as the group member for the FAA personnel interviews conducted on December 6, 2019 and January 24, 2020.
[3] Captain Fisher served as the Peninsula Aviation Services group member until he assumed the position of chief pilot for PenAir. He replaced by Captain Wilson on November 22, 2019.

accident. The flight had departed from Ted Stevens Anchorage International Airport (ANC), Anchorage, Alaska, at 1523.

D. DETAILS OF THE INVESTIGATION

October 18-25, 2019

The NTSB group members arrived in Anchorage on October 18, 2019 and completed the on-scene phase of the investigation on October 25. During this period, activities included retrieval and review of company and flight-deck documents, conduct of crew and other PenAir personnel interviews, examination of the airplane wreckage, documentation of the flight deck and crew flight bags, and an interview with a passenger witness.

December 2-6, 2019

The group travelled to Anchorage and conducted multiple interviews of PenAir and FAA personnel.

January 24, 2020

The group conducted a telephone interview with the FAA Aircrew Program Manager (APM) for the PenAir certificate.

E. FACTUAL INFORMATION

1.0 History of Flight

The crew reported for duty at 1355 for a scheduled 1510 departure. During his preflight inspection, the FO observed a worn ("flat") spot on the left outboard main landing gear tire. He photographed the tire and showed it to the captain. The captain took no further action after noting there was no cord showing on the tire. The flight departed the ANC gate at 1515, took off at 1523, and proceeded uneventfully towards DUT. According to the DUT weather observer's log, about 1708, 32 minutes prior to the accident and 20 minutes prior to the planned arrival time, the crew contacted her to obtain the latest airport conditions. The weather observer's log indicated that she advised the flight that the wind was from 200 degrees at 11 knots. [4]

[4] The DUT weather observers log is contained in the Weather Study for this accident. See the Weather Study for additional information on DUT weather. The crew stated in interviews it was standard practice for flights to call the weather observer at DUT (known as "Dutch weather") upon approaching the airport to get the current weather conditions at the airport. The crew stated that they routinely relied on Dutch weather and usually did not listen to the broadcast from the automated weather observation system (AWOS) located at the airport. In his second interview, the captain stated it was important at DUT to talk to a live observer on the ground because the weather can change from one end of the airport to the other, and there was only one AWOS. (According to the Aeronautical Information Manual, the AWOS-3P system located at DUT used an automated voice to broadcast the following over a designated

The crew planned for the RNAV (GPS) runway 13 approach, shown in figure 1. According to the crew, the approach proceeded without incident to the missed approach point. In his interview, the FO stated that they planned on flying the approach and once they "got down there" if they had visual conditions, they would make a determination of landing runway based on current winds. They would either continue with the runway 13 approach or call center and request a visual approach for runway 31. He stated that "the plan was to always to land with whatever winds favored the best runway."

Neither crewmember could recall the wind values passed to them by Dutch weather as they approached the airport, but both thought that they heard nothing which would require them to change their planned landing runway. The weather observer's log indicated that sometime before the first landing attempt, she told the crew that the winds were 270 degrees at 20 gusting to 25 knots. The log did not record the time she passed this information.

VHF radio frequency: altimeter setting, wind data, temperature, dew point temperature, density altitude, visibility, and cloud/ceiling data. The system broadcasts an updated weather message each minute.)

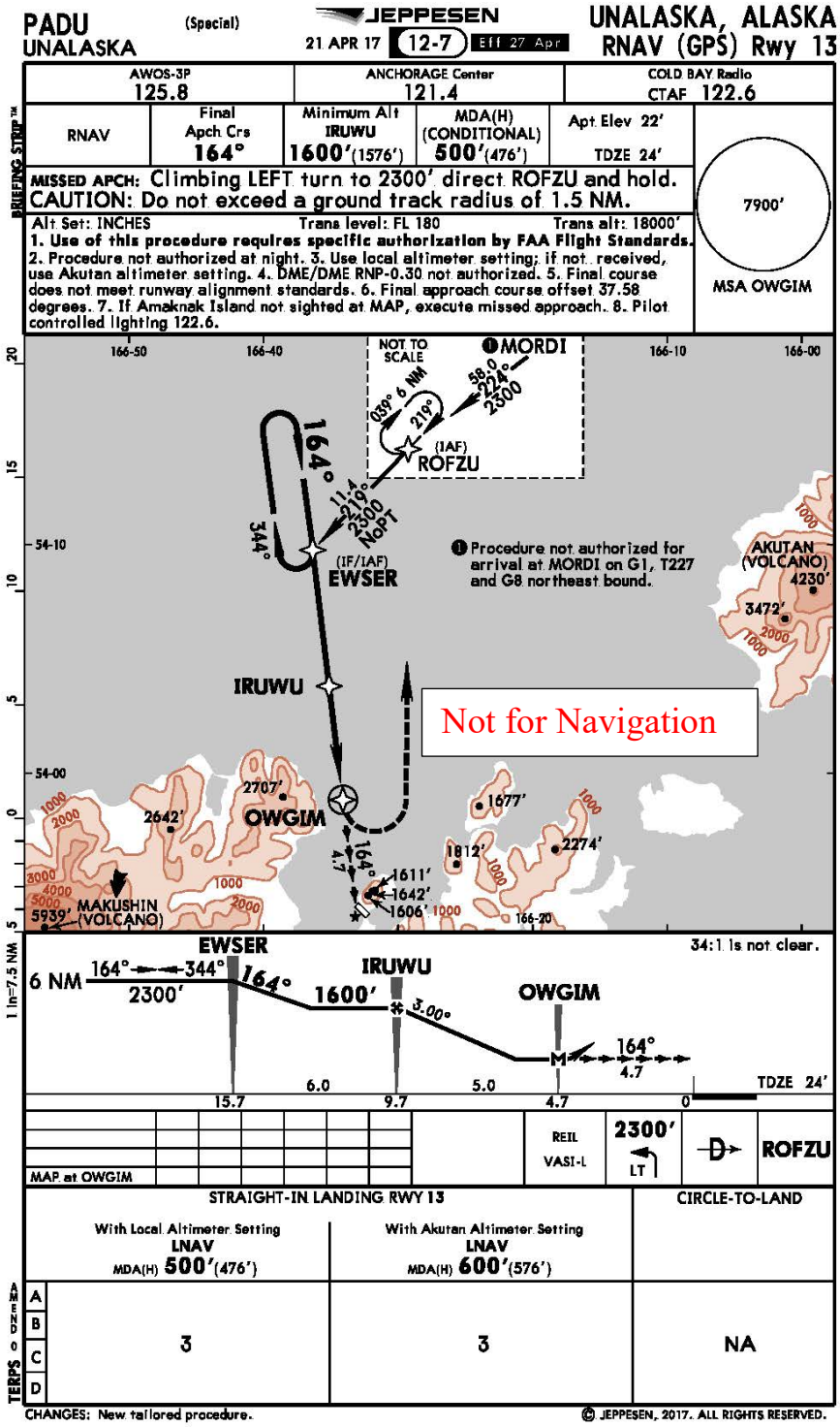

Figure 1. The RNAV 13 approach at PADU[5] (source: Jeppesen).

[5] PADU is the International Civil Aviation Organization (ICAO) identifier for the airport at Unalaska. DUT is the FAA identifier.

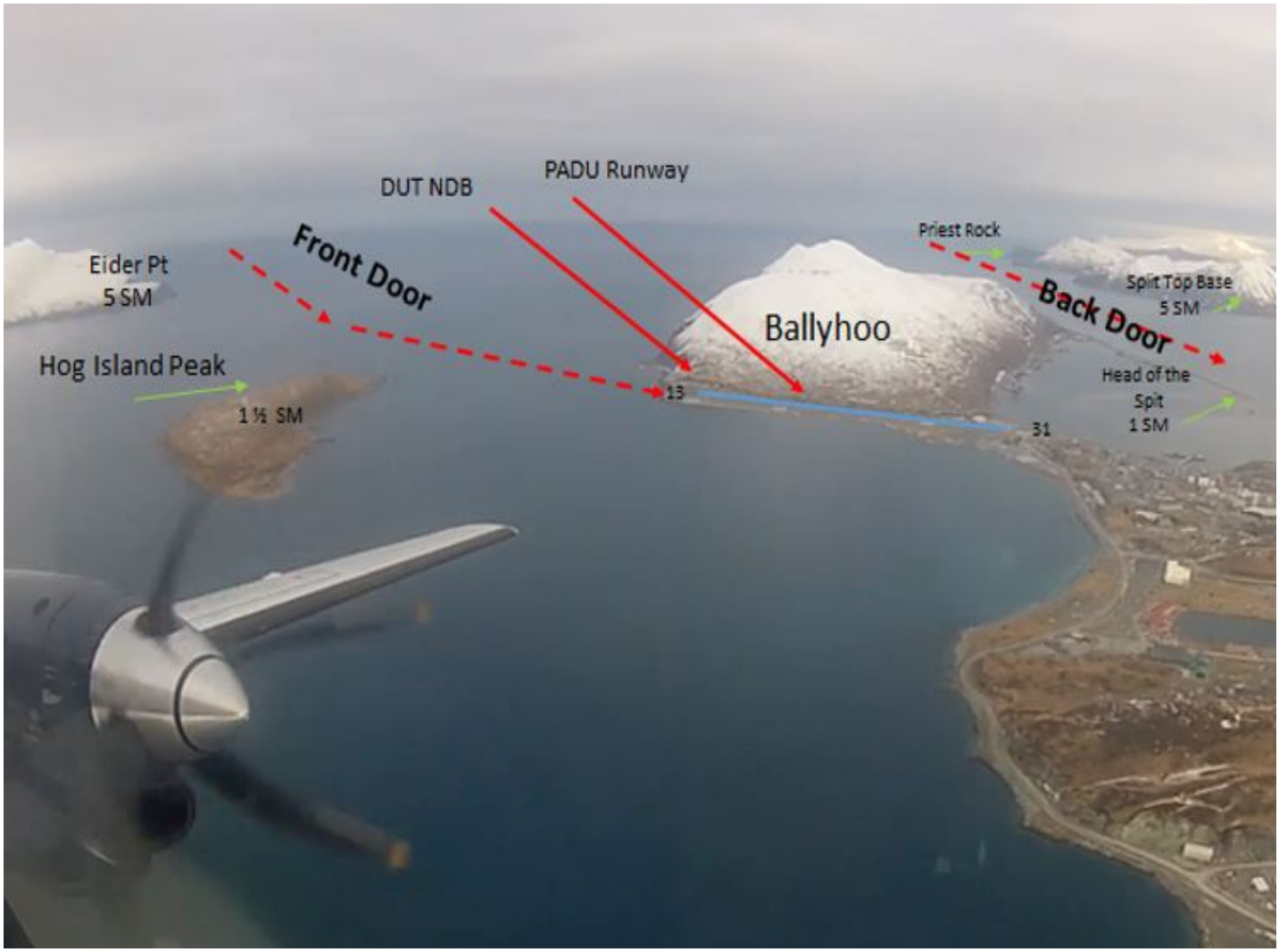

Figure 2. An aerial photo of the DUT environment (source: PenAir).

The missed approach point for the RNAV (GPS) runway 13 approach, OWGIM, was 4.7 miles from the runway, and crews were expected to fly visually from that point to the runway. OWGIM is approximately abeam Eider Point in figure 2. The dashed red line under "Front Door" in figure 2 is the approximate path an airplane would follow from OWGIM to runway 13 when flying the approach. When the flight reached OWGIM, the captain stated in his first interview that he could see "..Hog Island into the runway." (Hog Island was an island the northern tip of which was about 4,000 feet from the end of runway 13; it is not depicted on the approach chart in figure 1 but is the island that is indicated by the label "Hog Island Peak" in figure 2.) He also stated that there was a little precipitation, but that he could see "just fine." According to crew interviews, the flight proceeded visually from OWGIM to runway 13. On final, about 300 feet above the runway, the captain stated he reached up to turn off the engine anti-ice switches, located on the panel above his head. The captain stated that as he did this, the airplane got out of position on final and the approach become unstable. The FO stated that as the captain was turning off the anti-ice, the airplane was

"slightly destabilized." He stated that they stopped their descent momentarily and went off-course. The crew decided to conduct a go-around. The airplane began to climb and turn north to circle counterclockwise around Mount. Ballyhoo[6]. The flight followed what the FO described as a racetrack pattern around Mount Ballyhoo. The crew reported they remained in visual conditions during the go-around. In interviews, the captain and the FO stated that they could not remember the specific values of the wind reports given to the flight by Dutch weather during the go-around. The captain stated that he remembered hearing 310 degrees at one point during the go-around, then later in the go-around, he thought he heard 240 degrees, but could not recall what velocities were being reported. He remembered thinking the winds were calming down compared to the first approach. He stated that as he looked down the runway (on the second landing attempt) the windsock was indicating a direct crosswind, but not especially strong. The FO stated that the wind checks they received during the go-around did not indicate that they needed to change their planned runway. The weather observer's log indicated that she gave the flight winds of 310 degrees at 30 knots (read from her weather instruments, not from the AWOS) as the crew was in the go-around. As in the first approach, the airplane was configured for landing with 20 degrees of flaps. The captain stated that about 300 feet AGL, his speed was V_{REF}[7] +10, and then V_{REF} at touchdown. The airplane touched down about the 1100-foot point from the threshold of runway 13. The captain stated that immediately following the FO's call "beta lights" he applied reverse thrust and began wheel braking[8].

For a period of a few seconds, the crew reported that the braking/deceleration seemed normal. The FO stated in his interview that the touchdown was at 126 knots, and he "saw 80 knots at a normal rate like where I normally would." The Captain reported that the airplane decelerated quickly to 80 knots, then he noticed it began decelerating less. He stated he applied full brakes and maximum reverse thrust. He stated he felt no pulsing or "chattering" of the brakes, typically felt when the anit-skid system was engaged. Both crewmembers reported applying maximum pressure on their brakes shortly after that point. As the end of the runway approached, the FO recalled calling for the airplane to be steered right to avoid going straight off the end of the runway and into the water. There was a road on the right that looped towards and paralleled the runway overrun area for a short distance near the end of runway 13. The crew attempted to leave the runway and continue on the road as an alternative to going into the water. The FO reported he let off the left brake and applied full right rudder braking action to turn the plane off the runway and onto the road. The captain reported using the nosewheel steering wheel to turn the plane right. During his attempt to turn off the runway, the captain reported that it felt like "nil braking," as if on ice. According to the Aircraft Performance Group Chairman's Factual Report, the airplane was about halfway

[6] This was not the published missed approach procedure. This was the traffic pattern for the runway stated in the FAA chart supplement for DUT: "Tfc pattern around mountain." This referred to Mount Ballyhoo, a 1650-ft mountain which lies immediately to the north of the runway.

[7] V_{REF} is defined as 1.3 times the stalling speed in the landing configuration (V_{SO}). It is the required speed at the 50-foot height above the threshold end of the runway. Source: Pilot's Handbook of Aeronautical Knowledge, FAA-H-8083-25A, Chapter 10, page 10-32. V_{REF} is a speed determined by the manufacturer for flying an approach. It is variable based on landing weight and aircraft configuration (flap setting). See Section 4.3.4 for more information about V_{REF} for this flight.

[8] The "beta lights" call was required by company landing procedures. See Section 4.3.5. Beta lights indicate that the propellers have moved into the beta, or reverse thrust mode.

between the runway centerline and the right edge of the runway as it crossed the runway 31 threshold and then departed the overrun area. It then drifted further right, crossed a road that was just beyond the paved runway surface, and stopped on a rocky embankment abutting the road, with the nosewheel in Dutch Harbor, and the remainder of the airplane resting on the rocks.

Figure 3. Final resting spot of the aircraft (source: NTSB).

2.0 Flight Crew Information

The accident flight crew consisted of a captain and an FO.

2.1 The Captain

2.1.1 The Captain's Pilot Certification Record

FAA records for the captain indicated the following:

Private Pilot – Airplane Single Engine Land certificate issued March 24, 1984.

Commercial Pilot – Airplane Single Engine Land; Carrying passengers in airplanes for hire is prohibited at night and on cross-country flight of more than 50 nautical miles certificate issued July 6, 1985.

Commercial Pilot – Airplane Single Engine Land; Instrument Airplane issued October 4, 1985.

Notice of Disapproval – Commercial Pilot Airplane Multiengine Land; Instrument Airplane issued December 19, 1985. Areas for reexamination: Pilot Operations II, III, IV, VI (First Failure).

Commercial Pilot – Airplane Single and Multiengine Land; Instrument Airplane issued December 23, 1985.

Flight Instructor – Airplane Single Engine certificate issued September 5, 1986.

Flight Instructor – Airplane Single and Multiengine certificate issued December 4, 1986.

Flight Instructor – Airplane Single and Multiengine, Instrument Airplane certificate issued January 19, 1987. Renewed January 17, 1989; Reinstated September 20, 1991; July 2, 1996; Renewed July 8, 1998; July 11, 2000; June 26, 2002; June 25, 2004; June 15, 2006; July 22, 2008; July 30, 2010.

Airline Transport Pilot – Airplane Multiengine Land; DHC-8; Commercial Privileges Airplane Single Engine Land certificate issued September 20, 1991.

Airline Transport Pilot – Airplane Multiengine Land; DHC-8; SA-2000; Commercial Privileges Airplane Single Engine Land certificate issued July 8, 2019.

2.1.2 The Captain's Certificates and Ratings Held at Time of the Accident[9]

AIRLINE TRANSPORT PILOT (issued July 8, 2019)
Airplane Multiengine Land
DHC-8 SA-2000
Commercial Privileges Airplane Single Engine Land

MEDICAL CERTIFICATE FIRST CLASS (issued June 25, 2019)
Limitations: Must have available glasses for near vision. Not valid for any class after June 30, 2020.[10]

[9] Source: FAA.
[10] The captain held a special issuance medical certificate issued with a non-standard validity period.

2.1.3 The Captain's Training and Proficiency Checks Completed[11]

Date Upgraded to Captain on SA-2000	July 25, 2019
Date of Initial Type Rating on SA-2000	July 8, 2019
Date of Most Recent Proficiency Check	July 8, 2019
Date of Most Recent Training Event (LOFT)	July 10, 2019
Date of Most Recent PIC[12] Line Check	July 25, 2019

2.1.4 The Captain's Flight Times[13]

The captain's flight times:

Total pilot flying time	14,761 hours
Total PIC time	11,811 hours
Total SA-2000 time	131 hours
Total SA-2000 PIC time	131 hours
Flight time last 90 days	120 hours
Flight time last 30 days	27.8 hours
Flight time last 24 hours	2.6 hours

2.1.5 The Captain's 72-Hour History

On October 14, he reported going to bed about 2230.

On October 15, he awoke about 0630 to fly a flight from Anchorage to King Salmon and back to Anchorage He went to bed about 2230.

On October 16, he awoke about 0900 and flew a trip from Anchorage to Fairbanks and back to Anchorage. He went to bed about 2300.

On October 17, the day of the accident, the captain awoke feeling "great" about 0900.

Date	Bedtime (ADT)	Awakening time (ADT)	Sleep opportunity
Oct 16 to 17	2300	0900	10 hours
Oct 15 to 16	2230	0900	10.5 hours
Oct 14 to 15	2230	0630	8 hours

[11] Source: Crew training records received from PenAir.
[12] Pilot in command
[13] Flight times provided by PenAir. Does not include accident flight time.

2.1.6 The Captain's Background

According to PenAir personnel records, when he was hired in May of 2019, the captain had 14,630 total flight hours, with 14,003 turbine hours, 11,680 PIC hours, 1172 turbine PIC hours, and 14,003 hours in 121/135 time in Alaska. Most of this time came from his previous employment at Era Aviation (later Corvus Airlines) where he flew from 1991-2012 and accumulated time in the Dash-8 airplane. He also had held positions at Corvus Airlines as an instructor and check-airman on the Dash-8.

A review of FAA records indicated no prior accident, incident or enforcement actions involving the captain.

2.1.7 Personal Information

The captain reported normally needing about 7.5 hours of sleep to feel rested. He had a diagnosis of sleep apnea and used a CPAP machine consistently. He reported one alcoholic drink per day and his last drink was the day before the accident. He typically smoked about half a pack of cigarettes per day and reported his last cigarette prior to the accident was prior to departing Anchorage. He took prescription medication for hypertension. He used glasses for near vision; they were not used during the accident flight. He reported no issues with his hearing or medication use in the previous 72 hours that would have affected his performance during the accident flight.

First officers interviewed who had flown with the accident captain described him as an open communicator. They stated that he is interested in input from the first officers, takes feedback, and fosters a team environment. The accident FO stated that during the flight, they were "working as a team."

2.1.8 Experience with DUT

According to PenAir flight logs, since he had been employed at PenAir, the captain had flown to DUT 9 times before the accident flight. Five flights were conducted during his operating experience (OE) with a check airman. He could not say how many times he had flown into the airport prior to joining PenAir, but guessed it was about 20 times. The dates of all flights the captain flew to DUT with PenAir prior to the accident flight are listed below:

- July 15, 2019 (during OE)
- July 16, 2019 (during OE)
- July 20, 2019 (during OE)
- July 21, 2019 (during OE)
- July 22, 2019 (during OE)
- August 24, 2019
- October 8, 2019

- October 9, 2019
- October 11, 2019

2.2 The First Officer

2.2.1 The First Officer's Certification Record

FAA records for the FO indicated the following:

Private Pilot – Airplane Single Engine Land certificate issued March 25, 2015.

Private Pilot – Airplane Single and Multiengine Land; certificate issued March 11, 2016.

Notice of Disapproval – Private Pilot Instrument Airplane issued May 5, 2016. Areas for reexamination: Non-precision approach (First Failure).

Private Pilot – Airplane Single and Multiengine Land Instrument Airplane; certificate issued May 6, 2016.

Notice of Disapproval – Commercial Pilot Airplane Multiengine Land issued June 23, 2016. Areas for reexamination: Takeoffs, landings, go-arounds; Multiengine operations (First Failure).

Commercial Pilot – Airplane Multiengine Land; Instrument Airplane; Private Pilot privileges Airplane Single Engine Land certificate issued June 24, 2016

Notice of Disapproval – Commercial Pilot Airplane Single Engine Land issued October 8, 2016. Areas for reexamination: Takeoffs, landings, go-arounds; Emergency operations; Performance Maneuvers (First Failure).

Notice of Disapproval – Commercial Pilot Airplane Single Engine Land issued October 26, 2016. Areas for reexamination: Performance Maneuvers (Second Failure).

Commercial Pilot – Airplane Single and Multiengine Land; Instrument Airplane certificate issued November 25, 2016.

Flight Instructor – Airplane Single Engine certificate issued May 16, 2017. Renewed May 20, 2019.

Airline Transport Pilot – Airplane Multi Engine Land; SA-2000; Commercial Privileges Airplane Single Engine Land; Restricted in accordance with 14 CFR 61.167; SA-2000 circling approach VMC only; ATP circling approach VMC only certificate issued July 26, 2019.

2.2.2 The First Officer's Certificates and Ratings Held at Time of the Accident[14]

AIRLINE TRANSPORT PILOT (issued July 26, 2019)
Airplane Multiengine Land
SA-2000;
Commercial Privileges Airplane Single Engine Land;
Restricted in accordance with 14 CFR 61.167; SA-2000 circling approach-VMC only; ATP circling approach-VMC only

FLIGHT INSTRUCTOR (issued May 20, 2019)
Airplane Single Engine

MEDICAL CERTIFICATE FIRST CLASS (issued April 24, 2019)
Limitations: none

2.2.3 The First Officer's Training and Proficiency Checks Completed[15]

Date of Initial Type Rating on SA-2000	July 26, 2019
Date of Most Recent Proficiency Check	July 26, 2019
Date of Most Recent Training Event (LOFT)	July 28, 2019
Date of Most Recent SIC[16] Line Check	August 4, 2019

2.2.4 The First Officer's Flight Times[17]

The accident FO's flight times:

Total pilot flying time	1,447 hours
Total PIC time	1,370 hours
Total flying time SA-2000	138 hours
Total SA-2000 PIC time	0 hours
Flight time 90 days	138 hours
Flight time last 30 days	60 hours
Flight time last 24 hours	2.3 hours

2.2.5 The First Officer's 72-Hour History

On October 15, he had a day off work and went to bed about midnight.

[14] Source: FAA.
[15] Source: Crew training records received from PenAir.
[16] Second-in-command
[17] Flight times provided by PenAir and FO. Does not include accident flight time.

On October 16, he awoke about 0700 and flew two trips. The first trip was Anchorage to Sandpoint and back to Anchorage. After a 2-hour layover, he flew to Fairbanks and back to Anchorage. He went to bed about midnight.

On October 17, the day of the accident, the FO awoke about 0700. After getting his children ready for school, he took a nap from 0800 to 1200. He felt "fine" after awaking and left for the airport about 1330 for a 1355 show time for the accident flight.

Date	Bedtime (ADT)	Awakening time (ADT)	Sleep opportunity
Oct 16 to 17	0000	0700 with nap (0800-1200)	10 hours
Oct 15 to 16	0000	0700	7 hours

2.2.6 The First Officer's Background

He started flight training at the University of Alaska in 2014 and received his private pilot certificate in 2015. He continued flight training in Colorado and received his commercial single and multiengine certificate in 2016. He received his single-engine flight instructor certificate in May of 2017. He provided flight instruction at two different Colorado flight schools until May of 2018. In August of 2018, he began flight instructing at the University of Alaska Anchorage.

According to PenAir personnel records, he joined PenAir in May of 2019 and finished his Saab 2000 simulator training and received his type rating in July of 2019.

A review of FAA records indicated no prior accident, incident or enforcement actions for the FO.

2.2.7 Personal Information

The FO reported needing 8 hours of sleep to feel rested. He did not have any sleep disorders and kept a consistent schedule to awake at 0700 and typically slept about midnight. He did not take any prescription medication, smoke tobacco or use illicit drugs. He drank alcohol on occasion, and his last drink before the accident was about 2-3 days prior. He reported no issues with eyesight did not take any medication that would have affected his performance in the 72 hours prior to the accident.

Captains interviewed who had flown with the accident FO described him as "eager to learn" with good CRM (crew resource management). They stated that he was open with questions, input and effectively followed standard operating procedures. The accident pilot stated that the first officer "does a good job" and spoke up if he had concerns.

2.2.8 Experience with DUT

According to PenAir flight logs the first officer had flown to DUT 15 times before the accident flight. Two flights were conducted during his operating experience (OE) with a check airman. The dates of all flights the first officer flew to DUT prior to the accident flight are listed below:

- August 2, 2019
- August 3, 2019
- August 11, 2019
- August 16, 2019
- August 19, 2019
- August 24, 2019
- August 28, 2019
- September 2, 2019
- September 16, 2019
- September 28, 2019
- October 7, 2019
- October 8, 2019
- October 9, 2019
- October 10, 2019
- October 13, 2019

2.3 Medical and Pathological Information

Blood samples from the crew were taken the day of the accident and packaged in an FAA toxicology box, however the samples were not received by CAMI until February 3, 2020.[18] Post-accident toxicological testing was performed by the Civil Aerospace Medical Institute's (CAMI's) laboratory at FAA Forensic Sciences. Blood samples from the crew tested negative for ethanol and major drugs of abuse.

The captains and FO's medical certificate records were requested from the FAA and reviewed by the NTSB human performance specialist. No medical issues which could have contributed to the accident were discovered during the review.

[18] According to the Unalaska Police Department, there was an attempt to ship the specimens, however the package was not transported to the pickup location. The package was found in the Unalaska airport's loading dock area the week of January 27, 2020 and shipped to CAMI at that time.

3.0 Airplane Information

The accident airplane was a Saab 2000, Registration N686PA. See the Airworthiness Group Chairman's Factual Report for additional information on the airplane.

Figure 4. The accident airplane (source: hiveminer.com)

3.1 Weight and Balance Information

PenAir provided the following information on the accident flight:

WEIGHT & BALANCE / PERFORMANCE (maximum weights in bold)		
	Operating Empty Weight (OEW)	31,801
	Cargo / baggage	1,661
	Passenger weight	7,255
	Zero Fuel Weight (ZFW)	40,717
	Fuel	9,300
	Taxi fuel burned	300
	Takeoff Weight	49,717
	Maximum Takeoff Weight	**50,618**
	Planned landing weight (DUT)	45,213

	Maximum Landing Weight[19]	**46,114**
	Center of Gravity (index)	-1.7
	Takeoff CG limits	-19.2 – 1.6

3.2 Flight Deck Documentation

The flight deck documentation was accomplished with the assistance of the PenAir group member who was a Saab 2000 check airman. The condition of many systems as well as the position of roll, pitch, and yaw trim would normally be indicated on one of the electronic display units. During the flight deck documentation, the airplane was without power and so determination of these and other airplane systems' status was not possible. Except for the following, the flight deck was in the condition that the PenAir group member felt would have been expected for a normal flaps 20 landing, followed by an engine fire indication and subsequent evacuation. (The crew reported receiving an engine fire indication after the aircraft came to rest.) The PenAir group member noted the following non-standard items:

- Taxi light circuit breaker was out;
- Emergency light switch was off;
- Right engine fire handle was not pulled;
- Right fire bottle was not discharged;
- Parking brake was not set;
- Flight control (gust) lock was engaged.

The last five items on this list were not in accordance with the configuration that would be expected after a crew had conducted an evacuation. It was noted that while not part of the evacuation checklist, engaging the flight control lock moves the yoke forward and would assist the crewmembers in getting out of the seat.

The captain's control wheel was rotated about 30 degrees to the right. The FO's control wheel was level. The captain's wheel was rotated, and it locked in the level position, as was expected since the flight control lock was engaged.

On the day following the documentation with the PenAir group member, the Swedish accredited representative from the SHK (Swedish Accident Investigation Authority), who is a pilot with experience in the aircraft, and a member of his team from Saab were asked to verify and validate the previous day's observations. After experimenting with the left side control wheel, and looking at the linkage point under the airplane, the Swedish SHK and Saab representatives stated that the non-normal position of the captain's wheel was due to the roll-control linkage between the left and right wheels being damaged. Since FDR data and crew interviews did not indicate any roll control issues prior to the accident, they thought it was likely that the damage was a result of the accident or subsequent movement of the aircraft during recovery.

[19] This landing weight is the maximum allowable weight which met dispatch requirements discussed in Section 4.2

Additional notes from observations by the SHK accredited representative and the Saab technical advisor include:

- It was noticed that the flaps were at 20 degrees;
- Cabin pressure dump switch was in the dump position but may have been part of the evacuation procedure to do so;
- Gust lock may have been used to move control column forward to get out of seat (this is also part of the after-landing checklist);
- The interconnect mechanism (link) between left and right control wheels seemed to be damaged or disconnected;
- Overhead flight deck buttons are either flush (ON/Auto) or pushed out (OFF), and all appeared to be in the expected position;
- Rudder Trim moves a detent between the pedals. Rudder trim position seemed normal.

4.0 **Airport Information**

The sole runway at DUT had a Runway Design Code of B-II. This meant it was built to accommodate aircraft whose Aircraft Approach Category (AAC), which is based on V_{REF}, is B, and whose wingspan and tail height place it in Airplane Design Group (ADG) II.[20]

According to the standards contained in FAA Advisory Circular (AC) 150/5300-13A, Airport Design, the Saab 340 previously flown by PenAir into DUT had an AAC-ADG value of B-II. The Saab 2000 was a C-III airplane.

One runway design element specified in the AC is the length of the Runway Safety Area (RSA) beyond the end of the runway.[21] For a runway with Design Code B-II this length should be 300 feet. For runways built to accommodate airplanes in the AAC-ADG category C-III, the length should be 1000 ft.

The AC states that any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin unless air traffic control standard operating procedures are in place for those operations. The AC also states, "Aircraft operations cannot be prevented, regulated, or controlled simply because the airport or runway does not meet the design standards for a particular aircraft type."

PenAir began operating the Saab 2000 into DUT in 2016. The investigation sought to learn if either the FAA or PenAir had awareness of the mis-match or made any safety accommodations,

[20] Source of DUT Runway Design Code is the Survival Factors Specialist Report for this accident. For additional information about the DUT runway, see this report. For additional information about runway design standards, including the categorization of aircraft for runway design purposes, see FAA Advisory Circular (AC) 150/5300-13a, Airport Design.

[21] The AC defines Runway Safety Area as a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

performed any risk analysis, or considered any mitigations when planning for the operation of a C-III airplane to and from a B-II runway.

The FAA POI at the time of the Saab 2000's authorization to operate into DUT was interviewed specifically concerning this topic. He said he had no memory of any consideration of this issue. The transcript of this interview is contained in attachment 3.

The FAA was asked to provide any records or documentation that dealt with their authorization for PenAir to operate the Saab 2000 into DUT. They responded with the completed version of a data collection tool (DCT) titled "Aircraft Performance Operating Limitations, Design Assessment, Operations". According to the description contained in the DCT, its objective was to "Determine if the Certificate Holder will be able to; (1) Comply with regulations; (2) Operate Aircraft within the performance limitations of the Aircraft Flight Manual (AFM)." The DCT was completed in January of 2016. No mention was found in the DCT of consideration of Runway Design Code, AAC, or ADG when planning for operation into any airport.

PenAir stated that the individuals who would be able to answer questions about the initial authorization process for the Saab 2000 in 2015-2016 had since left the company due to the company's 2017 bankruptcy and recent furloughs of company personnel caused by the Ravn bankruptcy in April of 2020. The company provided the names of the Director of Operations and the assistant Director of Operations in place at the time of the Saab 2000 authorization. Both had previously left PenAir. Both were contacted, and neither had any recollection of this issue being considered during the 2015-2016 Saab 2000 authorization process.

When asked to provide related records or documentation, PenAir stated that any files they may have had regarding the authorization of the Saab 2000 to operate into DUT were lost in a ransomware attack the company suffered in December of 2019.

5.0 Company Organization, Procedures, Policies and Training

5.1 Company Organization

Peninsula Aviation Services, Inc. was a *14 CFR* Part 121 certificate holder, and as such was required by *14 CFR* Part 119 to have certain management positions filled with qualified personnel. These positions were director of safety, director of operations, chief pilot, director of maintenance, and chief inspector. Other key positions at PenAir included manager of OCC (Operations Control Center)/chief dispatcher, manager of flight standards, manager of flight safety, manager of crew scheduling, manager of safety.

Persons in these positions had responsibility for implementation and oversight of the policies, procedures, and training discussed below. For a company organization chart and a description of the responsibilities and authority of these and other PenAir management personnel, see attachment 13, PenAir's Corporate Administration Manual excerpt.

5.2 Dispatch Procedures

A dispatch release package was prepared by PenAir dispatch operations and provided to the pilots prior to departure. The package included landing performance information for the runways at the destination airport. The dispatch release for this flight is contained in attachment 4.

The PenAir Wind Chart, a graphic prepared and distributed by the Medallion Foundation[22] was prepared for certain airports PenAir served and was used by dispatch as a tool in deciding if a flight could be released. The *PenAir Dispatch Procedures Manual* (DPM) stated the following about the use of the wind chart;

> "The wind charts, when available for an airport, provide the dispatcher with maximum wind limits recommended for dispatch. When winds border either the wind chart recommendations and/or the maximum demonstrated crosswind component for that aircraft, dispatch is not authorized unless:
>
> a. the dispatcher and the PIC agree that the flight can be conducted safely, and
> b. There is an alternate airport listed on the release"

For DUT, the wind chart indicated the maximum wind allowed in the sector which included the current and forecast wind direction for DUT was 30 knots. The chart indicated that this number should be reduced by 10 knots for pilots with less than 300 hours PIC in aircraft type. The accident captain reported 169 hours PIC in the Saab 2000. After applying the 10-knot reduction for low-time PIC, the wind limit for DUT was 20 knots within the sector the wind was coming from. The forecast wind for this sector was 20 knots.[23] The Wind Chart for DUT is attachment 5.

In addition to the requirements imposed by the wind chart in flight planning, dispatchers had to consider the requirements of 14 *CFR* Part 121.195, which sets forth limitations for aircraft departure weights to ensure that they will arrive at their destination at a weight which would allow them to stop on the runway with a safety margin. Specifically, an aircraft may depart at a weight no greater than that which, allowing for expected fuel burn during the flight, would allow it to stop within 60 percent of the available runway distance at the destination[24]. To meet this requirement, PenAir dispatchers use landing performance tables from the PenAir manual titled *Airport Analysis Manual Saab 2000 Alaska*. (An excerpt from this manual is contained in attachment 10.) Tables

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[22] According to their website, the Medallion Foundation was an Alaska-based, non-profit foundation that used FAA and private funds to promote aviation safety in Alaska. The foundation began its work in 2001 and ceased to function in September 2019.

[23] According to the weather information attached to the PenAir release for the flight, the forecast winds were 270 at 15 gusting to 25 knots. The instructions for using the wind chart indicated that when gusts were 10 knots or greater, one-half the gust value should be added to the steady-state wind to determine if the wind would be within the limit for any given sector on the chart. This would result in winds of 15 + 0.5(10) knots, or 20 knots for the purposes of the chart. The METAR in effect at the time of the flight's dispatch showed winds of 250 at 8 gusting to 22 knots. Using the formula above, this resulted in a wind of 15 knots (8+ 0.5(14)) for the purposes of the wind chart.

[24] According to the FAA Chart Supplement for DUT, the landing distance available for runway 13 was 3900 feet. This is the value used in calculating the landing performance required by 14*CFR* 121.195. For additional information on the runway or the DUT airport, see the Survival Factors Specialist Report for this accident.

in this manual provide maximum landing weights for various conditions and aircraft configurations that will allow the aircraft to meet the 60 percent requirement.

According to Section 26.8.3 of the *PenAir Company Flight Manual for the Saab 2000* (referred to in the remainder of this report as the CFM), dispatchers use the dispatch release provided to pilots to inform them of the maximum allowable landing weight for the destination airport and to give them an explanation of how the weight was calculated. This explanation included the assumed landing conditions (flap setting, airplane loading, wind, runway length.) The CFM also stated that prior to flight, the PIC must ensure that the calculations and remarks provided by the dispatcher are accurate. In his interview, the captain stated he reviewed the dispatch release.

The remarks section of the dispatch release for the accident flight contained the following:

LDG WGT CALC'D USING ZERO WIND FLAPS 35, ALT CG II LDG, RWY 13[25]

Another section of the release showed that the landing weight referred to in this remark, the maximum allowable weight, was 46,114 pounds.

According to load manifest documents (see attachment 4) completed prior to departure, the captain calculated the planned landing weight to be 45,213 pounds upon arrival at DUT. This was a required calculation to be done after all passengers, fuel, and baggage had been loaded on the airplane.

5.2.1 Risk Assessment

Section 21.5.8.1 of the *PenAir General Operations Manual* (GOM) and section 24.5.15 of the PenAir DPM each direct that for certain flights, full risk assessment for the flight must be completed by the PIC. One of the conditions requiring a risk assessment is flight to a special airport such as DUT. The manuals direct that, using the PenAir Flight Risk Assessment form (GOM 5 in the GOM), the PIC will determine the numerical value for the risk based on the conditions present. If the form indicates a numerical risk higher than 25 the PIC must receive approval from the Director of Flight Operations, Chief Pilot, or their designated representative prior to departing. The form for this flight is included at attachment 16.

5.3 Arrival Procedures

5.3.1 Approach and Landing Brief

Section 21.6.11 of the GOM provided guidance for the approach and landing briefing. The manual stated that the briefing should be performed prior to the top of decent when possible. The briefing should include items related to an expected instrument approach as well as several other items if a

[25]Source of this information is the PenAir flight plan for flight 3296, 17 Oct 2019. ALT CG II (alternate forward CG limit) was an airplane loading criterion, which when met, allow increased landing weights that still meet the FAA landing performance requirement. Review of the load manifest for the flight shows that the airplane center of gravity (CG) was within the ALT CG II limit.

visual approach is anticipated. These items include planned procedures in the event of a rejected landing, expected call-outs, and planned approach speeds. A GOM excerpt containing this guidance is shown in figure 4.

21.6.11 Approaches and Briefings

The approach and landing briefing should be performed prior to the top of decent when possible. The following briefing procedures will vary depending on the type of approach anticipated. It is better to brief for an instrument approach, and encounter visual conditions, than to find a complicated instrument approach is necessary after briefing for a visual approach. The pilot flying (PF) conducts the briefing to the pilot monitoring (PM) on the following:

a. Approach procedure;
b. Chart date, including effective date;
c. Navigation frequencies including DME hold requirements;
d. Altitudes (including MSA and any segment altitudes corrected for approaches to Cold Temperature Restricted Airports);
e. Final approach course;
f. Decision height, minimum visibility, and minimum descent altitude, including visual descent points as appropriate;
g. If circling approach, review the planned procedure;
h. Missed approach procedure;
i. Expected call-outs (PenAir CFM procedures are Company standard);
j. Planned approach speeds, timing as required; and
k. Any questions?

If a visual or contact approach is anticipated, brief at least the following:

a. Landing runway and planned pattern entry;
b. Pattern altitude;
c. Planned procedures in the event of a rejected landing;
d. Expected call-outs;
e. Planned approach speeds;
f. Any questions?

Figure 5. PenAir approach briefing procedure (source: PenAir GOM).

The CFM also contained guidance for the conduct of the approach briefing within the In-Range Checklist. A CFM excerpt containing this guidance is shown in figure 5.

26.3.3.9 In Range

Accomplish the In Range Checklist during the initial descent.

ATIS ..... Checked ..... Both

- PM should obtain the ATIS/airport weather and runway information, both pilots should then discuss the approach and landing.

EFBs ..... Configured ..... C/F

Ram mounts properly secured to each respective flight deck side widow. EFBs secured in their mount and appropriate chart displayed.

Briefing/Bugs ..... Complete/Bugged ..... Both

- Pilot flying should brief the approach. It will include at least the following:

  i. Review of STAR (if applicable)
  ii. Instrument approach to be used

    A. Date of chart (amendment number)
    B. Type of approach
    C. Runway elevation
    D. Useable runway length
    E. Pilot controlled lighting actions (if installed)
    F. Airport name
    G. MSA for the approach
    H. Nav Aids and fixes for the approach
    I. Courses and associated altitudes for each approach
    J. segment
    K. Minimum altitude (DA, MDA) and RA setting
    L. Required visibility
    M. Initial heading and altitude for the missed approach procedure

  iii. Any non-standard crew member assignments
  iv. V-Speeds (V_{REF}, V_{CL}, V_{MM}) to include the use of ice speeds

Figure 6. In-range checklist excerpt (source: PenAir CFM).

In the above procedure and checklist (figures 4 and 5) there is no requirement for the crew to reassess landing distance or runway selection based on the most recent airport conditions.
No requirement could be found in PenAir manuals for a crew to conduct any type of landing performance or distance assessment after a flight departs. There is no regulatory requirement for this assessment. FAA Advisory Circular (AC) 25-32, *Landing Performance Data for Time-of-Arrival Landing Performance Assessments,* provides guidance and methods for airplane operators who choose to develop landing performance data for time-of-arrival landing performance assessments. The AC encourages operators who elect to develop this tool to take into consideration numerous factors including runway condition, aircraft configuration and weight, and wind at time of arrival.

In his first interview, the captain stated he conducted the approach briefing for the RNAV 13 approach. In his second interview, he stated that landing performance for a flaps 20 landing was checked.

5.3.2 Stabilized Approach

Section 21.6.11.1 of the PenAir GOM provided the company's policy for stabilized approaches. For a visual approach, the manual states that by 500 feet above the airport elevation, the following must be indicated:

1. Airplane in landing configuration
2. Airspeed within 10 knots of V_{FA}[26]
3. Airplane established on proper vertical and course guideline with VS less than 1000 feet per minute
4. Checklist complete (except autopilot disconnection)

The GOM did not provide any guidance on steps to take when an approach is not stabilized.

According to FAA AC 91-79A, *Mitigating the Risk of a Runway Overrun Upon Landing*, "A stabilized approach terminating with a landing in the TDZ[27], timely deployment of airplane deceleration devices, and braking technique are critical elements to mitigating the landing runway overrun risk. It is a responsibility of operator to consider the factors presented, and incorporate these items, as well as the extensive research and safety information available regarding avoiding a runway overrun into training programs and operations manuals. It is the pilot's responsibility to apply the landing assessment process, exercise conservative aeronautical decision-making (ADM), be proficient in the landing techniques for the conditions to be encountered, and that a go-around or diversion are mitigations to prevent a runway overrun."

The AC further states the following concerning stabilized approaches:

- "Airplane should be in landing configuration early in the approach. Landing gear, flaps, trim set per guidance. Landing checklist items should be complete.
- Airplane should be stabilized on profile before descending through the 1000 feet window (IMC) or the 500 feet window (VMC). The airplane must be in the proper landing configuration, on the correct lateral track, the correct vertical track (electronic, visual, or lacking either, an optimum glidepath angle of 3 degrees) and at the proper airspeed.

[26] V_{FA} is the final approach speed. According to Section 26.7.2.1 of the CFM, final approach speed is determined by adding the V_{REF} speed from the *Saab 2000 Performance Binder* to any appropriate wind increment (Wi) as defined in Section 4.3.4 of this report.

[27] Touchdown zone. According to FAA AC 91-79A, *Mitigating the Risks of a Runway Overrun Upon Landing*, a point 500-3000 feet beyond the runway threshold, not to exceed the first one-third of the runway.

- Optimum descent rate for a 3-degree approach path is based on groundspeed. Pilot must maintain airplane's target approach speed.
- Indicated airspeed should not be more than Vref+5, with appropriate adjustments for wind or other factors."

Later, the AC states:

"It is paramount that the airplane arrives at the approach threshold window on speed. If the pilot has planned to carry additional airspeed beyond the threshold due to gusty surface wind conditions, then the effect of this additional airspeed/groundspeed should be included in the actual landing distance. A balked landing maneuver should be executed if the airplane does not cross the runway threshold at the planned airspeed.

NOTE: A 10 percent excess landing speed causes at least a 21-percent increase in landing distance. The excess speed places a greater working load on the brakes because of the additional kinetic energy to be dissipated. Also, the additional speed causes increased drag and lift in the normal ground attitude, and the increased lift reduces the normal force on the braking surfaces. The deceleration may suffer during this range of speed immediately after touchdown, and it is more probable for a tire to be blown out from braking at this point."

5.3.3 Landing Performance

As noted in Section 4.2 the airplane was dispatched with maximum allowable landing weight of 46,114 pounds, based on a planned flaps 35 landing at DUT. The captain chose a flaps 20 landing as he approached DUT. According to the *Airport Analysis Saab 2000 Alaska*[28] company manual, a planned flaps 20 landing would have only allowed dispatch of the flight with a maximum planned landing weight of 40,628 pounds (ALT CG II). The landing weight the captain calculated prior to departure was 45,213. In his second interview, the captain stated that landing calculations for a flaps 20 landing were performed. He did not provide specific actions taken in this performance calculation. In this interview, he also stated that the standard setting was 20, non-standard was 35. He did not provide a reference for this statement. When asked about his decision to use flaps 20 versus a flaps 35 setting for this landing in his second interview, the captain stated that using full flaps could lead to floating or ballooning, and that it could be difficult pinpoint your landing spot. He thought that a flaps 20 landing would produce maybe an extra 150 feet of landing roll versus a flaps 35 landing.

[28] An excerpt from this manual, showing landing weight limits for DUT and an explanation of the table is included at Attachment 10.

The *Saab 2000 Performance Binder* company manual provided actual distances needed for the airplane to come to a stop on the runway, based on aircraft weight, winds, flap settings, and airport pressure altitude.[29]

According to tables in the *Saab 2000 Performance Binder,* the unfactored landing distance for the accident airplane at DUT was:

For flaps 20 - 2657 ft (no wind), 3536 ft (15 knot c[30]);
For flaps 35 - 2390 ft (no wind), 3224 ft (15 knot tailwind)

Additionally, Section 26.2.1.4 of the CFM contained a 15-knot tailwind limitation for takeoff and landing for the Saab 2000.

5.3.4 Approach Speed.

Section 26.7.2.1 of the CFM called for visual approaches to be flown at the appropriate VREF speed (from the *Saab 2000 Performance Binder*) plus a wind increment, Wi. The manual gave the following guidance for determining the wind increment:

(Wi) = 1/2 headwind component + gust

A note adds that the gust value should always be added regardless of wind direction.

This section of the CFM also states that the final approach speed (VREF plus any required wind corrections) should be the nominal speed during final approach down to 50 ft above the landing surface (expected height when crossing runway threshold on a normal approach) where the speed should be bled off for landing.

Section 26.7.5.1 of the CFM, *Normal Landings*, states that this speed, VREF+Wi, should be held until crossing the runway threshold on final approach.

According to the *Saab 2000 Performance Binder*, based on planned flap setting and landing weight, the VREF for this approach was 126 KIAS.

According to Flight Data Recorder (FDR) data from the landing, the airplane was about 127 KIAS at 26 ft AGL as it crossed the runway 13 threshold, and at 126 KIAS at touchdown on the runway.

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[29]This is known as an "unfactored landing distance" because it does not take in to account the 60% factor used for aircraft dispatch, noted in Section 4.2 above. 14 *CFR* Part 25.125 requires aircraft manufacturers to determine this distance for certification. It is the distance measured from the runway threshold, (crossing the threshold at a height of 50 ft and at speed V_{REF}) to the point where the aircraft has come to a stop. This information is presented in the PenAir *Saab 2000 Performance Binder* and includes additional information which allows pilots to correct the unfactored landing distance for such things as head-or tailwinds, and contaminated or non-level (sloping) runways. An excerpt from the binder is included in attachment 6.

[30] In the *Saab 2000 Performance Binder*, 15 knots was the highest tailwind for which unfactored landing distances were provided.

In his interview, the FO stated that he recalled VREF was 126 KIAS, and that "we bug ref+10, so 136." He stated, "You know we didn't have gusting too much, so we just stick with the plus ten." When asked, he replied that even with a tailwind, he would still do VREF+10. Just before touchdown, he recalled calling "ref" as the thousand-foot markers passed underneath the airplane.

In his interview, the captain reported "normally we run what's called ref+10. On the approach I was ref+15. Right about 300 feet, I'm ref+10. Maybe right at the runway, I'm ref+5, and at touchdown, I was on ref. I planted it right on the thousand...right on the touchdown zone."

5.3.5 Landing Procedures

Section 26.7.5.1 from the CFM contains the following chart showing the required crew callouts during a normal landing:

PenAir THE SPIRIT OF ALASKA

COMPANY FLIGHT MANUAL SAAB 2000

ARRIVAL

PAGE: 7-17
REVISION: 4
DATE: 07/12/17

Pilot Flying	Pilot Monitoring
Immediately after touchdown lower the nose wheel and retard PLs to GI.	When both BETA lights have illuminated, **"BETA"**.
At 80 KIAS.	**"80 KNOTS"**

LEFT PILOT	RIGHT PILOT
Upon hearing ***"80 Knots"*** **"BOTTOMS"** Transition to rudder and nose wheel steering (60 KIAS) for directional control. Assume PL control. By 60 KIAS move the PLs out of reverse.	Apply aileron input into the wind. Apply forward pressure on the yoke. **"TOPS"**
When exiting the runway engage the GUST LOCK.	Complete the After Landing flow when the After Landing Checklist is called for.
End of Procedure	

Figure 7. Crew duties and required call-outs during landing (source: PenAir CFM).

This section of the CFM also states;

> "Stabilize the aircraft on the selected approach speed with a stabilized rate of descent. Airspeed should remain stabilized a (sic) VREF, plus appropriate wind, malfunction, and/or ice increments if applicable, until crossing the runway threshold on final approach."

5.4 Company Designated PIC Airport Qualification

Section 21.2.6 of the GOM contains a list of airports that require a company designated PIC airport qualification[31]. A pilot cannot act as PIC on a flight to one of these airports unless they meet the requirements of this section.

DUT is one of three airports designated in this section. (The list contains four airports, one of which was listed as a company designated airport only for the Saab 340, an airplane PenAir no longer flew.)

According to the GOM, to be eligible for the company designated PIC airport qualification, a pilot must have either 300 hours PIC in PenAir aircraft or 100 hours PIC in PenAir aircraft with an email or letter of recommendation from a company check airman that has flown with the candidate, and an email or letter from the chief pilot, approving the candidate. Once a pilot becomes eligible, he will begin the qualification process. Details of this process are contained in Section 22.11.1.12 of the *PenAir Flight Operations Training Manual* (FOTM.)

The qualification module in the FOTM contains the following elements: briefing; preflight planning; normal takeoff, en route, and landing procedures; abnormal considerations; debrief. The completion standards are stated as:

> *"A line-check airman will observe at least one round-trip flight to the company designated airport for the qualification designated. A separate qualification flight is required for each airport. The pilot in command will demonstrate the skills and knowledge required to operate in and out of the company designated airport on regularly scheduled flights."*

Though not specifically mentioned in the FOTM description of the qualification module, in interviews, several pilots stated that it was common practice to check landing performance data as they approached the airport, after they had received the current weather conditions for the airport.

The captain's training records contained FOTM form 116, *Saab 2000 Company Designated PIC Airport Qualification*. The form was signed by a company line-check airman and indicates the segment completion date for DUT qualification was July 20, 2019. The form is shown in attachment 7. Crew flight time and duty log records from PenAir, attachment 8, indicated that on

[31] This airport designation is created by PenAir and is not the same as the FAA's designation of *Special Pilot-in-Command Qualification Airports,* though the 3 airports on this PenAir designated airports list are also contained on the FAA's list of *Special Pilot-in-Command Qualification Airports*. According to *14 CFR* Part 121.445, these airports are designated due to items such as surrounding terrain, obstructions, or complex approach or departure procedures. The FAA requirement for a PIC to operate into a *Special Pilot-in-Command Qualification Airport* was that either the PIC or the SIC had to have flown into the airport within the last twelve months or the PIC had become familiar with the airport via pictorial means. (A review of PenAir crew scheduling records logs indicated that both accident crewmembers met the 12-month requirement.)

July 20, 2019, the captain flew one round trip from Anchorage to DUT with a company line-check airman. The records also indicated that the accident captain had flown into DUT on July 15, 16, 21 and 22, 2019 with a check airman. The company line check airman who flew into DUT with the accident captain on the July 20, 2019 signed the form on August 1, 2019, below a statement certifying that the captain had the skills and knowledge to operate in and out of DUT airport.

The line-check airman who completed the captain's qualification module for company designated PIC airport qualification also signed the captain's OE[32] form indicating the completion of OE on July 25, 2019. The captain's OE form is included at attachment 9. A different check airman completed the captain's FAA-required line check the same day.

PenAir did not provide any evidence (letters or emails from a check airman and the chief pilot) that the accident captain had met the eligibility requirements for obtaining the designated airport PIC qualification. As of the date which the qualification was completed, July 20, 2019, the captain had obtained 15 hours and 46 minutes flight experience in the Saab 2000. He had no other PIC experience in company aircraft. PenAir had operated only the Saab 2000 since before the captain had been hired at the company.

The same records also indicated that the accident captain had 95:57 time in the Saab 2000 on August 24, his first trip to DUT as a PIC without a check airman, which would have required him to meet the company designated PIC airport qualifications mentioned above.

The GOM stated that once the company designated PIC airport qualification process is complete, the PIC will be given the specific airport qualification within SkedFlex (the PenAir crew scheduling software program.) Without the SkedFlex airport qualification, crew scheduling personnel would receive an alert from the program if they attempted to assign the PIC to a flight to one of the company-designated airports requiring PIC qualification. The GOM does not specify the exact process for entering this qualification into SkedFlex. In an interview, the PenAir person responsible for pilot records stated she remembered entering the accident captain's DUT qualification into SkedFlex. She did this based on her receipt of the FOTM form 116 for the captain. The form had all the required signatures. She stated she was only responsible for verifying the signatures, not that the pilot had met any other requirements, such as the 300/100-hour PIC time or any required check airman or chief pilot letters or emails. In her second interview, the PenAir chief pilot stated that she may have been the one who told crew scheduling that the captain was eligible for the company designated PIC airport qualification so they could input that into SkedFlex. She stated she was aware of the 300 PIC hour requirement at the time of the accident but thought she could waive it. She was not aware of the requirements for letters or emails from a check airman and the chief pilot, nor that the 300 hours could only be waived to 100 hours.

[32] Operating Experience is a mandated period of flying (in this case a minimum of 20 hours) following completion of flight training, when a newly qualified pilot must fly with a check airman. Upon completion of OE, a captain must have a line check, also given by a check airman.

5.4.1 Company Designated PIC Airport Qualification Changes

Senior pilots described the process of company designated airport qualification prior to the change in management after Ravn's acquisition. The PenAir 300-hour minimum to qualify for company designated airports was intended as a time in type and time in left seat with company prior to beginning company designated airport training. The 100-hour waiver was intended as a method to account for pilots who may have had substantial aircraft experience, seat experience, and specific company designated airport experience that may be newer to the company. The former chief pilot of PenAir stated as an example that while 300 hours was default, a pilot who had "10 years flying Saab 2000s" or "10 years of flying in and out of Dutch Harbor every day" might be considered a candidate for the 100-hour waiver.

He continued stating that historically, new captains had quite a bit of experience flying into DUT as a first officer prior to upgrading. Prior to the qualification of accident pilot, senior pilots could not recall a time where the waiver was used on a captain that had not upgraded to captain without first serving as a PenAir first officer in the aircraft. The manager of flight safety recalled never seeing documentation for a 100-hour waiver or check airman recommendation for any pilot in the company.

After management changes following Ravn's acquisition of PenAir, pilots noted conversations by the PenAir chief pilot and Ravn VP of flight operations that a change to company designated airport qualifications was being considered. Pilots said that at a pilot meeting held in early summer 2019, they introduced the idea to reduce experience requirements for flying into company designated airports. Pilots recalled the management intent as either to reduce the requirement to 100 hours, to remove the minimum time requirement completely and rely on check airman recommendation or change the requirement to 300 hours in right or left seat of the aircraft as qualifying. The manager of safety said that Ravn was making an argument that a pilot with accident captain's experience level should be qualified to fly into DUT.

The VP of flight operations at Ravn said that while there must have been reasons why 300 hour minimum was put in place in the first place, it wasn't consistent with how 121 carriers flew in the continental U.S. "I'm not convinced that it's necessary because it's not done elsewhere. There are mountains around the country, around the world. Air is air. Physics are physics. Why is this different?" The chief pilot at PenAir said that the idea to reduce requirements came from the VP of flight operations at Ravn and that she "didn't disagree" with his initiative to reduce requirements.

Several senior pilots and check airmen had concerns about the potential change to reduce qualification requirements. One check airman stated his concern about the change was that pilots were not going to receive the training needed to fly into company designated airports.

Another check airman said that in late July/early August 2019 the chief pilot met him at the door after every company designated airport training flight to ask if the candidate had been signed off to fly to the company designated airport, stating "there was obviously a need for us to get more pilots qualified for company designated airports." Another captain stated that the chief pilot had

attempted to schedule her and several other recently upgraded pilots to get qualified at Dutch Harbor before they reached 300 hours in the left seat. "[The chief pilot] never asked me if I was comfortable or wanted to do it. She just kind of took the first step of making it happen." This captain declined the qualification training prior to 300 hours in favor of gaining more experience in the left seat.

Another pilot said that the chief pilot had informally asked his opinion about number of flight hours a pilot would need to get checked out at a company designated airport. The pilot was concerned that a set number of hours would not necessarily equate to proficiency, stating in his interview that proficiency depended not only on the pilot but exposure to the varying environmental and operational conditions prevalent at company designated airports. He felt that the new management was unfamiliar with operations in the Alaska Peninsula and making changes without understanding specific challenges and were not actually open to hearing input from senior pilots with DUT experience.

Others did not bring up concerns because they felt that their concerns would not be heard if they had and that the decision reduce the qualification requirements had already been made without line pilot input. When asked why he did not voice his concerns to management, one pilot said that it appeared as if management viewed senior crew members at as a threat. He felt, as a senior crewmember, his job wasn't in jeopardy but he "didn't want to make any waves." He further stated the proposed change in company designated airport qualifications was a "big factor" for his resignation as check airman.

The chief pilot at the time of the accident was asked about concerns pilots had to reducing the company designated airport experience requirement. She stated that several pilots voiced concerns, but she didn't ask them why, stating "I just assumed it was because they thought Dutch Harbor was an airport, a special airport."

5.5 Special Instrument Approach Procedures

For approaches in other than VFR weather minimums, four special instrument approach procedures existed for DUT. Attachment 12 contains two of these approaches (labelled PADU), one of which the accident crew used. These special approaches were not available to the general flying public but required special FAA authorization to use. For PenAir, this authorization was contained in Operations Specification[33] (OpsSpec) number C-081. The OpSpec required pilots receive training on these approaches. That training is discussed in Section 4.6.1.

[33] OpsSpecs are issued to air carriers by the FAA. According to the FAA, OpSpecs provide an effective method for establishing safety standards that address a wide range of variables. In addition, OpSpecs can be adapted to a specific certificate holder or operator's class and size of aircraft and type and kinds of operations. OpSpecs can be tailored to suit an individual certificate holder or operator's needs. Only those authorizations, limitations, standards, and procedures that are applicable to a certificate holder or operator need to be included in OpSpecs.

5.6 Pilot Training

5.6.1 Training for Special Instrument Approach Procedures

To use the special approaches at DUT, PenAir was required by OpsSpec C-081 to provide their pilots with training specific to these procedures. According to PenAir, this was accomplished through a computer-based training presentation titled *New DUT Special Approaches.* This presentation was a detailed review of the four special approaches at DUT. This review included various aerial photographs of the area. Figure 2 is an excerpt from this presentation.

Special approaches training was also included in the FOTM *Saab 2000 Fight Crew Operating Experience* (OE) training modules 22.11.1.10 (for PICs), and 22.11.2.9 (for SICs) This was training conducted in the airplane after the pilot's completion of simulator training.

5.6.2 Training in Aircraft Performance and Airport Analysis

Pilot training in aircraft performance and airport analysis was listed in two separate sections of the FOTM. The first section described training which was conducted during *Basic Indoctrination* ground training for all new pilots. The module dealing with this topic in the basic indoctrination curriculum was titled *Aircraft Performance and Airport Analysis* and was one and a half hours in length. The outline of the module is shown in figure 7 below.

PenAir
THE SPIRIT OF ALASKA

FLIGHT OPERATIONS TRAINING MANUAL

PAGE: 3-7
REVISION: Reissue
DATE: 12/21/18

FLIGHT CREW GROUND TRAINING

22.3.1.2.3 Aircraft Performance and Airport Analysis

Hours: 1.5

Objective: The student will have a thorough understanding of environmental effects on aircraft performance including weather, geography, and airport condition.

Courseware: APG Airport Analysis and PenAir's GOM

Lesson Elements:

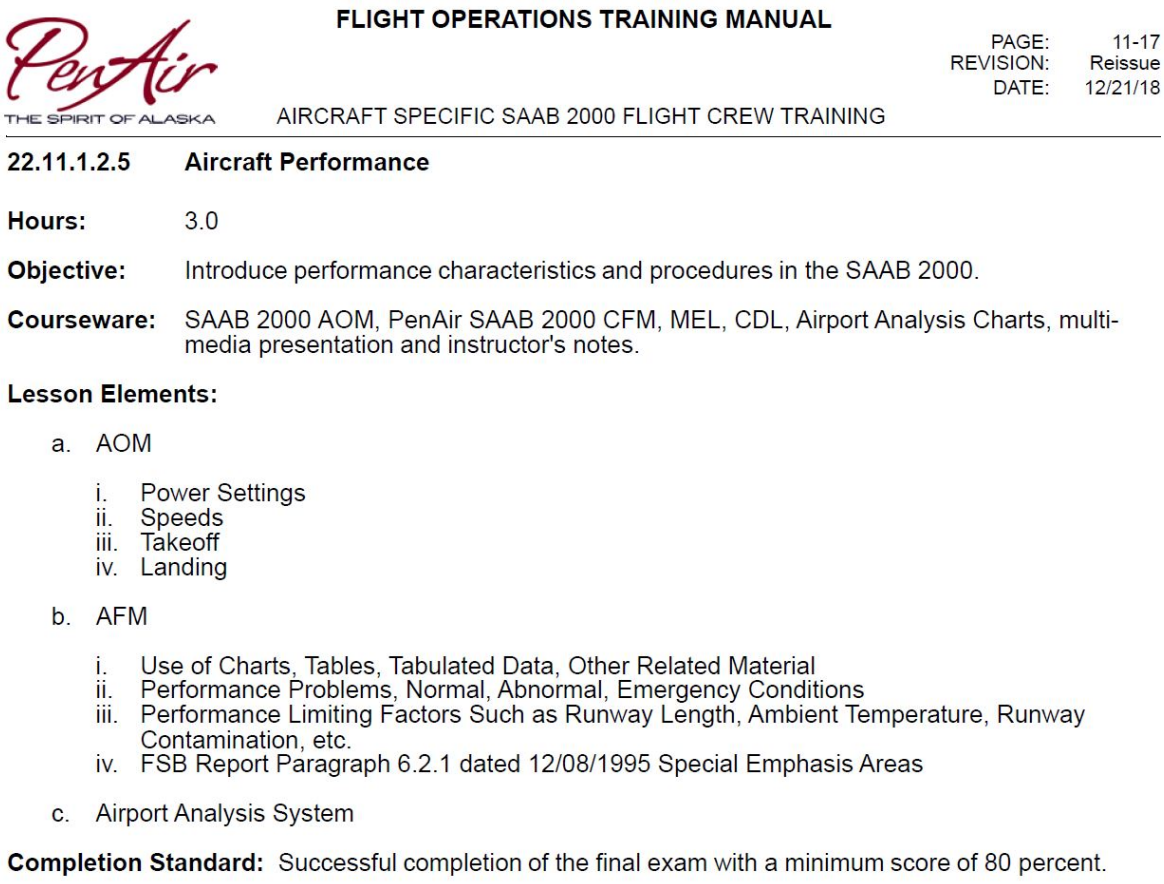
a. Definitions (i.e. balanced field, obstruction plane, maximum, etc.)
b. Effects of Temperature and Pressure Altitude
c. General TERPS Criteria (obstacle clearance standards)
d. Airport Analysis Appropriate to PenAir Flight Operations
e. Effects of Contaminated Runways
f. All Weather Surface Operations (night and low visibility environments)
g. Runway Incursions
h. Landing and Hold Short Operations (LAHSO)

Completion Standards: Presentation of materials and answering any student questions will successfully complete this module.

Figure 8. PenAir Aircraft Performance and Airport Analysis training module (source: PenAir FOTM).

Training records received from PenAir indicated that the captain had completed the aircraft-specific ground training section of new-hire training, which included this aircraft performance module, on June 20, 2019. The FO completed this section on the same day.

The second section of training in this area was in the *Aircraft Specific Saab 2000 Flight Crew Training* curriculum in the FOTM. This section, *Aircraft Performance*, contained elements that would be expected to address the use of the unfactored landing distance tables found in the *Saab 2000 Performance Binder*, an appendix of the CFM, and discussed in Section 4.3.3. *The Saab 2000 Aircraft Performance* training module was three hours in length and is shown in figure 8 below.



FLIGHT OPERATIONS TRAINING MANUAL

PAGE: 11-17
REVISION: Reissue
DATE: 12/21/18

THE SPIRIT OF ALASKA

AIRCRAFT SPECIFIC SAAB 2000 FLIGHT CREW TRAINING

22.11.1.2.5 Aircraft Performance

Hours: 3.0

Objective: Introduce performance characteristics and procedures in the SAAB 2000.

Courseware: SAAB 2000 AOM, PenAir SAAB 2000 CFM, MEL, CDL, Airport Analysis Charts, multi-media presentation and instructor's notes.

Lesson Elements:

a. AOM

i. Power Settings
ii. Speeds
iii. Takeoff
iv. Landing

b. AFM

i. Use of Charts, Tables, Tabulated Data, Other Related Material
ii. Performance Problems, Normal, Abnormal, Emergency Conditions
iii. Performance Limiting Factors Such as Runway Length, Ambient Temperature, Runway Contamination, etc.
iv. FSB Report Paragraph 6.2.1 dated 12/08/1995 Special Emphasis Areas

c. Airport Analysis System

Completion Standard: Successful completion of the final exam with a minimum score of 80 percent.

Figure 9. PenAir Aircraft Performance training module (source: PenAir FOTM).

One presentation used in this training, titled *Saab 2000 Aircraft Performance*, included training in the use of the *Airport Analysis Manual Saab 2000 Alaska* described in Section 4.2. An excerpt from this presentation is at attachment 11. The presentation also included training on the determination of the maximum allowable landing weight discussed in Section 4.2.

5.6.3 Preflight Inspection Training

The company's *Preflight Inspection Training Curriculum* was contained in Section 22.11.1.3.2 of the FOTM. It was scheduled for 2 hours. Guidance for the conduct of the preflight inspection was contained in Section 26.4 of the CFM. Section 26.4.7, *Exterior Inspection* contained the exterior preflight checklist. The checklist contained an item labelled *Main Landing Gear/Tires* with the direction to pilots "Condition." No other specific guidance for evaluating the condition of the aircraft tires could be found in the FOTM or the CFM.

In pilot interviews, including those with the accident crew members, it was stated that checking the general condition of the tire and looking for proper inflation, cord showing through the rubber, pieces of rubber missing, tread being present, and flat spots was the standard practice for preflight inspection of aircraft tires.

5.6.4 CRM Training

According to the company flight operations training manual. PenAir provided pilots with CRM ground training during initial new hire, annual recurrent, upgrade, flight instructor, and check airman training. The initial new hire and upgrade CRM training was 4 hours and recurrent CRM training was 1 hour consisting of 44 PowerPoint slides and videos. The modules described CRM elements of communication, attitudes and behavior, problem solving, human factors, situational awareness, conflict resolution, team building, and threat and error management. At the time of the accident, PenAir did not offer leadership training to pilots upgrading to captain. The accident captain had received leadership training at Corvus prior to his position at PenAir.

5.6.5 Training Experience – Go-Around in Traffic Pattern in Saab 2000

Interviews with PenAir pilots revealed that pilot experience with VFR traffic patterns in the S2000 mostly consisted of entering traffic patterns for landing. While pilots often conducted IFR missed approaches, pilots rarely conducted go arounds followed by flying a VFR traffic pattern for the same runway.

The company's special approach training for DUT (provided during initial pilot training) detailed the IFR approaches and missed approaches into the airport. At DUT, several pilots had experience flying north into the bay and maneuvering to re-enter the traffic pattern for the opposite runway, however pilots interviewed could not recall conducting a go around and flying a traffic pattern to return to the same runway at DUT. A former chief pilot for PenAir said that a discussion of a VFR traffic pattern would be appropriate as part of the DUT special airport qualification.

During S2000 initial and recurrent simulator training, pilots reported conducting go arounds upon ATC direction for obstacles, vehicles, or aircraft on the runway. Interviewed pilots did not recall any go arounds during training conducted for weather or without ATC direction.

5.7 Company Safety Program

PenAir had a safety management system (SMS) in place. The director of safety had been in his position since July 2017 and had become management director of safety for the Ravn Air Group in July 2019. The manager of safety of PenAir reported to the director of safety and was responsible for the day to day operation of the safety program. She had earned a safety management certificate from the University of Southern California and had completed aircraft accident and incident investigation training along with SMS training at Embry Riddle. She also did safety and Taproot training through Medallion Foundation. The manager of flight safety was an additional position in the safety department who was an internal evaluator and conducted audits within flight operations.

Pilots received 2 hours of SMS training during indoctrination ground training and 30 minutes during annual recurrent. This training highlighted the structure of the program, reporting options, and company culture.

5.7.1 Pilot Reporting

PenAir had recently transitioned from a WBAT reporting system to Vistair with the merger with Ravn. The company was working on a phone app to submit safety reports as well. PenAir also had paper reporting forms that can be put into locked drop boxes located in the crew room and maintenance area. According to the manager of safety, pilots could also email, call or walk in to the safety department directly or use their 24-hour safety and security hotline.

According to the manager of safety, reports involving Dutch Harbor were mostly related to passengers under the influence of alcohol. The manager of safety nor director of safety could recall any flight operations-related concerns for any of the special airports PenAir serviced.
The safety department had received 30-40 reports on average per month for the previous year. The director of safety stated that reporting from flight crews could be improved. The manager of safety estimated reports from flight crews averaged less than 10 per month. She stated that flight crew reporting decreased after the company declared bankruptcy and there were several months in the past year with no submissions from flight crews.

While many pilots stated that they would have no concerns reporting safety issues, several pilots stated that they were not comfortable voicing concerns or felt that their concerns would not be heard. The chief pilot said that “old school PenAir pilots” may be reluctant to approach her with concerns, but she had attempted to convey that it was safe for them to come to her. Following several interactions, multiple pilots said they did not believe the chief pilot was approachable to voice concerns to. After having a concern about management response to a flight decision, one pilot opted not to submit a safety report stating that despite anonymous reporting, the chief pilot of PenAir and VP of flight operations of Ravn would know she submitted it, stating “ I was afraid of how that was going to affect my job here.”

5.7.2 Punitive Repercussions and Safety Culture

One interviewed pilot, who had decided to resign as a check airman and go back to flying the line, relayed the chief pilot's response to his decision which he interpreted as a threat. "Her response was, 'what if I say no? I'm going to make you work a lot. It's going to be a pay cut.' And so on my drive home, I told my wife I almost got fired."

Most pilots did not feel they received pressure to fly from management. Senior captains and check airmen felt that their decisions to decline flights were not questioned by management, however said that the reason they were not questioned was because they were senior. Several that had been interviewed relayed an instance where a new captain was questioned for refusing a flight near weather minimums.

This captain described the situation where she was approached by the Pen Air chief pilot and Ravn VP of flight operations after refusing to the flight. She stated that "my crew and I don't really feel comfortable … showing up at work at 6:00 a.m., being here for 6 hours already and going out to Dillingham and doing a non-precision approach down to minimums and probably going missed off of it, quite frankly, with where the weather was at." After returning to the base, the chief pilot and VP of flight operations "counseled" her on her decision. She said that "they didn't understand what was unsafe about it. [The VP of flight operations] told me that it was unprofessional and immature and that I didn't get to have my own set of standards. He told me if I had a legal airplane, legal weather and legal crew, then it was my job to go. He said that the only thing I should be worried about was what the forecast visibility was, because that was the only thing that was legally binding." She said he further stated that if she made a decision like this again, "he didn't trust my decision-making in the left seat, and he didn't think I deserved to be on the flight line anymore."

When asked about the situation during investigation interviews, the chief pilot stated that the captain's job was never in jeopardy and the issue was that a "young and inexperienced" captain had "walked off the job." When the VP of flight operations was asked if the captain's job was in jeopardy after this event, he said that it depended on if she changed her behavior and showed maturity, "if she's not able to show the maturity level… in your job, then, yeah, of course, your job is in jeopardy."

There were several senior pilots who were concerned about the management's response to the captain's situation. One pilot said the newer pilots refer to senior pilots for guidance and he decided to talk to the chief pilot about it considering the possibility that new management didn't understand the nuances of the weather like senior pilots who encountered it consistently. When the senior pilot voiced his concern with the chief pilot and suggested the chief pilot talk with the VP of flight operations about safety culture, "[the chief pilot] made it real clear that I'd better get my facts straight before I go talking to [the VP of flight operations]." The director of safety said that he had heard several reports regarding pilots getting reprimanded by the VP of flight operations at Ravn and reached out to the PenAir president. He relayed that the president spoke with the VP of flight operations and told the VP of flight operations that they need to maintain their just culture.
The accident captain also described an encounter about 2 years prior with in his role as director of training at Ravn where a pilot confided in him that they felt they would be "called on the carpet"

by the VP of flight operations for reporting a safety issue. The accident captain approached the CEO of the company for a resolution, however the VP of flight operations "got a little upset because I went directly to [the CEO]" and told the accident pilot that "a heads up would have been nice."

Several pilots said that the safety culture at PenAir was good, "They've always followed up on everything that I know of" and "take it very seriously." Others said they were "not impressed at all" with the safety culture, of which one pilot rated the culture a level 3 on a scale from 1 to 10 at the time of the accident.

Many pilots stated that pilot morale had begun to decline after the bankruptcy, in the summer of 2019 with the conversations of reducing special airport qualification minimums, and further after the recently upgraded captain was "counseled" in August by the chief pilot and VP of flight operations. The director of safety stated that he considered the overall safety culture as "still good" but said that he had pilots approach him saying they were "not as comfortable anymore… saying something or making a decision and being questioned on it" since the new management came in.

5.8 Company History[34]

Peninsula Airways was founded in Pilot Point, Alaska, in 1955. The company became incorporated in 1965 and purchased a fixed-base operation in King Salmon, Alaska. In 1967, the company became a full-time contractor to Reeve Aleutian Airways. By 1973, charter service was extended to Dutch Harbor. In 1980, all operations were conducted under *14 CFR* Part 135. In 1991, the company began doing business as PenAir, and became a code-share partner with Alaska Airlines. In 1996, the company began operating some flights under *14 CFR* Part121 while continuing to operate other flights under *14 CFR* Part135. In 1997 PenAir acquired two Saab 340B airplanes and in 1998, relocated its headquarters to Anchorage. By 2005, it was the state's largest commuter airline, operating a fleet of 40 aircraft (Part 121 and Part 135), and providing scheduled service to 36 communities in southwest Alaska.

In 2012, the company was awarded Essential Air Service[35] (EAS) routes in the northeast United States and began operating from Boston to Presque Isle and Bar Harbor, Maine, and Plattsburgh, New York. In 2015, the airline was awarded another EAS contract route in the lower 48 states and began operating flights out of a hub in Portland, Oregon. In 2016, the airline added several non-EAS routes out of the Portland hub. Also, in 2016, the airline received delivery of 4 Saab 2000 airplanes. These were primarily for use in the airline's Alaska routes, offering a larger plane and faster service between Anchorage and Dutch Harbor (DUT) and the Bristol Bay region. In late 2016, PenAir was awarded additional EAS contracts, and began operating flights out of a new hub in Denver, Colorado.

[34] Sources: Internet archive of PenAir website pages from June 12, 2018, June 27, 2018, December 20, 2018 and January 21, 2019; flyravn.com; and court records for the US Bankruptcy Court for the District of Alaska.

[35] EAS is a US Department of Transportation (DOT) program enacted to guarantee that select small communities, which had been served by airlines prior to the1978 airline deregulation, would maintain commercial air service.

In August 2017, PenAir filed for Chapter 11 bankruptcy. According to a bankruptcy court filing dated August 6, 2017, the company's financial performance deteriorated partly because the Denver and Portland hubs "have not lived up to expectations." On August 4, 2017, PenAir ceased taking reservations on the 4 non-EAS routes out of Portland. On August 7, 2017, the airline provided the DOT the required 90-day notice for ending EAS service out of Denver (5 routes) and Portland (1 route.)

On June 1, 2018, PenAir announced the suspension of all operations out of its Boston Hub, citing a loss of mechanics and pilots who accepted positions with other airlines after the DOT awarded all the EAS routes to other carriers.

On October 10, 2018, a court overseeing the PenAir bankruptcy proceedings approved the acquisition of the airline at auction by Peninsula Aviation Services, Inc. Peninsula Aviation Services made their bid through J.F. Lehman and Company, which owned Ravn Air Group Inc. The acquisition received final approval from the DOT in December of 2018.

According to one FAA interview, the process of merging PenAir with the Ravn Air Group carrier Corvus Airlines began in April 2019.

OpsSpec A502, *Air Carrier Merger and/or Acquisition,* was issued by the FAA to Peninsula Aviation Services, Inc., with an effective date of August 28, 2019. The OpsSpec authorized Peninsula Aviation Services, Inc. to conduct operations in accordance with the OpsSpec during the merger transition period with Corvus Airlines. This period would begin on June 14, 2019 and continue until all required training and qualifications are accomplished or within 60 months.

PenAir, along with other Ravn Air Group air carriers ceased flight operations in April of 2020, and Ravn Air Group filed for Chapter 11 bankruptcy.

6.0 **FAA Oversight**

FAA oversight of PenAir was conducted by the Denali CMO located in Anchorage, Alaska. The Denali CMO provides oversight for *14 CFR* Part 121 carriers based in Alaska. The Denali CMO contains certificate management teams (CMTs) assigned to air carriers it has oversight responsibilities for. The CMT for PenAir also had responsibility for oversight of Corvus Airlines. Corvus Airlines was an Alaska-based carrier which was in the process of merging with PenAir. (See Section 4.8 for additional information on the merger of the two certificates.) The CMT for these two operators consisted of a principal operations inspector, a principal maintenance inspector, a principal avionics inspector, a dispatch inspector, and a cabin safety inspector. There were two other operations inspectors who were serving as aircrew program managers. Supervising these inspectors is an FLM for the PenAir and Corvus CMT, and an office manager, who has responsibility for all the CMTs in the Denali CMO.

The FAA uses the Safety Assurance System (SAS) as a tool to accomplish air-carrier oversight. According to the FAA website:

"The Safety Assurance System improves the certification and surveillance processes for air carriers. Under SAS our primary responsibilities are:
•Verify an applicant can operate safety and comply with regulations and standards before issuing a certificate and approving or accepting programs.
•Conduct periodic reviews to verify that a certificate holder continues to meet regulatory requirements when the environment changes: and
•Validate the performance of a certificate holder's approved and accepted programs for the purpose of Continued Operational Safety (COS)."

For more information regarding the FAA's SAS, see Volume 10, chapter 1, Section 1 of the FAA Flight Standards Information Management System[36] (FSIMS).

For information regarding the SAS evaluation of a certificate holder's management of significant changes, see FSIMS Volume 6, Chapter 2, Section 18.

A request was submitted to the FAA for any SAS records regarding PenAir oversight for the past two years. The response was reviewed, and, prior to the accident, no systemic or recurring issues or areas of FAA concern regarding PenAir operations, training, or safety were noted.

F. LIST OF ATTACHMENTS

Attachment 1 – Record of conversation with passenger witness
Attachment 2 – Company Interviews
Attachment 3 – FAA Interviews
Attachment 4 – Flight 3296 load manifest, flight plan, dispatch release
Attachment 5 – DUT Wind Chart
Attachment 6 – PenAir Saab 2000 Performance Binder excerpt (unfactored landing distance)
Attachment 7 – Captain's Designated PIC Airport Qualification form
Attachment 8 – Crew flight time and duty logs
Attachment 9 – Crew Operating Experience (OE) records
Attachment 10 – PenAir Airport Analysis Manual excerpt
Attachment 11 – PenAir Saab 2000 Aircraft Performance presentation excerpt
Attachment 12 – PADU RNAV (GPS) (Special) Instrument Procedure charts
Attachment 13 – PenAir Corporate Administration Manual excerpt
Attachment 14 – PenAir TOLD form
Attachment 15 – DUT Weather Office visit record
Attachment 16 – Flight 3296 Flight Risk Assessment form

[36] FAA Order 8900.1 defines FSIMS as the repository of all Flight Standards policy and guidance concerning aviation safety inspector's job tasks. It is a Flight Standards directive which aviation safety inspectors use as the system of record for all Flight Standards policy and guidance. It is available at fsims.faa.gov.

Submitted by:

Sathya Silva, PhD
Human Performance Investigator

Captain Marvin Frantz
Air Safety Investigator