Aviation Investigation Final Report

Location:	Unalaska, Alaska	**Accident Number:**	ANC20LA015
Date & Time:	January 16, 2020, 08:06 Local	**Registration:**	N547LM
Aircraft:	Beech 200	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Serious, 2 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Unspecified)		

Analysis

According to the pilot, when the airplane's airspeed reached about 90 knots during the takeoff roll, he applied back pressure to the control yoke to initiate the takeoff and noted a brief positive rate of climb followed by a sinking sensation. The airspeed rapidly decayed, and the stall warning horn sounded. To correct for the decaying airspeed, he lowered the nose then pulled back on the airplane's control yoke and leveled the wings just before impacting the ocean.

The pilot stated there were no preaccident mechanical malfunctions or anomalies that would have precluded normal operation. Wind about the time of the accident was recorded as 110° downwind of the airplane at 15 knots gusting to 28 knots. The passengers recalled that the pilot's preflight briefing mentioned the downwind takeoff but included no discussion of the potential effect of the wind conditions on the takeoff.

The airplane's estimated gross weight at the time of the accident was about 769.6 pounds over its approved maximum gross weight, and the airplane's estimated center of gravity was about 8.24 inches beyond the approved aft limit at its maximum gross weight.

It is likely that the pilot's decision to takeoff downwind and operate the airplane over the maximum gross weight with an aft center of gravity led to the aerodynamic stall during takeoff and loss of control. Downwind takeoffs result in higher groundspeeds and increase takeoff distance. While excessive aircraft weight increases the takeoff distance and stability, and an aft center of gravity decreases controllability.

Several instances of the operator's noncompliance with its operational procedures and risk mitigations were discovered during the investigation, including two overweight flights, inaccurate and missing information on aircraft flight logs, and the accident pilot's failure to complete a flight risk assessment for the accident flight. The operator had a safety management

system (SMS) in place at the time of the accident that required active monitoring of its systems and processes to ensure compliance with internal and external requirements. However, the discrepancies noted with several flights, including the accident flight, indicate that the operator's SMS program was inadequate to actively monitor, identify, and mitigate hazards and deficiencies.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's improper decision to takeoff downwind and to load the airplane beyond its allowable gross weight and center of gravity limits, which resulted in an aerodynamic stall and loss of control. Contributing to the accident was the inadequacy of the operator's safety management system to actively monitor, identify, and mitigate hazards and deficiencies.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	Maximum weight - Capability exceeded
Environmental issues	Tailwind - Effect on equipment

Factual Information

HISTORY OF FLIGHT

On January 16, 2020, about 0806 Alaska standard time, a Beech 200, Lifeguard N547LM, sustained substantial damage when it was involved in an accident near Unalaska, Alaska. The airline transport pilot was seriously injured, and the two passengers were uninjured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 135 air ambulance flight.

At the time of the accident, dark night conditions prevailed.

According to the pilot, after checking the weather on the automated weather observing system, he completed the before takeoff checks. The airplane was equipped with a cockpit voice recorder, which recorded an automated weather report for 0754. According to the passengers seated in the back of the airplane, the pilot conducted a preflight briefing that mentioned the downwind takeoff but included no discussion of the potential effect of the wind conditions on the takeoff. The pilot stated that he taxied for a runway 31 departure and initiated the takeoff roll. He said he recalled the wind conditions being reported as 100° at 9 knots.

As the airplane accelerated down the runway, the airspeed was about 75 knots at midfield and increasing. When the airspeed reached about 90 knots, the pilot applied back pressure to the control yoke to initiate the takeoff and noted a brief positive rate of climb, followed by a sinking sensation. According to the passengers seated in the back, the initial takeoff run, and acceleration of the airplane did not appear unusual; however, the airplane seemed to remain on the runway longer than normal. The pilot stated that the airspeed rapidly decayed, and the stall warning horn sounded; the cockpit voice recorder recorded a tone consistent with a stall warning horn. To correct for the decaying airspeed, the pilot lowered the nose and immediately noticed the airplane's illuminated lights reflecting off the surface of the water.

One of the passengers reported that he felt the nose of the airplane lift from the surface of the runway before settling back down followed by another rotation and a substantial bump. The other passenger reported that he felt the nose of the airplane lift off the runway, followed by a substantial bump as if the airplane struck something at the end of the runway. The pilot pulled back on the airplane's control yoke and leveled the wings just before the airplane impacted the ocean. After the airplane came to rest and began to fill with water, the three occupants exited the airplane through the over-the-wing emergency exit into a liferaft.

The pilot stated there were no preaccident mechanical malfunctions or anomalies that would have precluded normal operation.

Weight and Balance

According to the last documented weight and balance information located for the airplane from September 21, 2018, the basic empty weight of the airplane was 8,478.5 lbs with a center of

gravity of 187.44 inches. At the airplane's maximum takeoff gross weight, 12,500 lbs, the center of gravity range was 185.0 inches to 196.4 inches.

The airplane's weight and balance at the time of the accident was estimated based on the weights of the pilot from his most current FAA medical examination (267 lbs) and passengers (260 lbs and 225 lbs), and the weight of the airplane's equipment, medical equipment, and personal gear on board (484.3 lbs). The aircraft was fueled the day before the accident, and the fueler reported that he had filled both the main and auxiliary fuel tanks. The fuel onboard at the time of the accident was about 544 gallons (3,644.8 lbs). The gross weight of the airplane at the time of the accident with full fuel tanks was calculated at about 13,269.6 lbs, and the estimated center of gravity was 204.64 inches.

The pilot stated that the typical standard fuel load for Dutch Harbor Airport (DUT), Unalaska, Alaska, was full main tanks and 45 gallons in each auxiliary tank for a total of about 450 gallons, which the pilot said he thought was on board the accident flight. Using the standard fuel load of 450 gallons (3,015 lbs) in place of the known quantity of 544 gallons of fuel in the weight and balance calculation for the accident flight results in a gross weight of about 12,640 lbs with a center of gravity of 214.84 inches.

Two aircraft flight logs were recovered from the accident airplane. The top page contained a place for the pilot to input flight information that included weight and balance information; multiple carbon copies were available underneath the top page. However, only the original document contained the weight and balance information for the flight. Only a copy of the flight log for the accident flight was recovered; therefore, any weight and balance information computed by the pilot and recorded on the original document was not discovered. In addition, the flight log copy appeared to be missing other pieces of required information.

On January 15, the day before the accident, the airplane was repositioned from Ted Stevens Anchorage International Airport (ANC), Anchorage, Alaska, to DUT. The gross weight for this flight was estimated at about 13,619.8 lbs, and the center of gravity was estimated as 192.67 inches. A flight log recovered for the repositioning flight indicated a loaded weight of 12,497 lbs and a center of gravity of 188.9 inches.

The Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25 states in part:

Effects of Weight on Flight Performance

A heavier gross weight will result in a longer takeoff run and shallower climb, and faster touchdown speed and longer landing roll.

Effects of Weight on Stability and Controllability

Although the distribution of weight has the most direct effect on this, an increase in the airplane's gross weight may be expected to have an adverse effect on stability, regardless of location of the center of gravity.

Effect of Load Distribution

Generally, an airplane becomes less controllable, especially at slow flight speeds, as the center of gravity moves aft.

Flight Risk Assessment

According to Aero Air's program manager, the operator used two flight risk assessments at the time of the accident. A pilot would fill out a simplified flight risk assessment if the flight met the criteria for the low-risk category and a full flight risk assessment for flights other than low risk. No flight risk assessment was completed for the accident flight. According to criteria used by the operator, a full flight risk assessment would have been required for the accident flight. According to the director of operations, flight risk assessments were reviewed or audited by the company's administrator on-call group.

Cockpit Voice Recorder

The airplane was equipped with a Fairchild A-100S cockpit voice recorder (CVR) designed to record 30 minutes of digital audio, including channels for each flight crewmember, one channel for a cockpit observer, and a channel for the cockpit area microphone. The National Transportation Safety Board Vehicle Recorder Division successfully downloaded audio from the crash-survivable memory unit.

Safety Management System (SMS)

The operator had an SMS system in place at the time of the accident, which included a safety assurance component. Chapter 4 of the Aero Air, LLC Safety Management System Manual, Safety Assurance, stated in part:

Safety assurance demands Aero Air actively monitor systems and processes to continuously identify new hazards, measure the effectiveness of aircraft operations and maintenance, and monitor risk controls that have been implemented in order to ensure compliance with internal and external requirements.

History of Flight

Takeoff	Stall warn/stick-shaker/pusher
Takeoff	Loss of control in flight (Defining event)
Takeoff	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Airline transport	**Age:**	41,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	August 16, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	July 18, 2019
Flight Time:	6470 hours (Total, all aircraft), 756 hours (Total, this make and model), 5850 hours (Pilot In Command, all aircraft), 14 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N547LM
Model/Series:	200 B200	**Aircraft Category:**	Airplane
Year of Manufacture:	1998	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	BB1642
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	December 5, 2019 AAIP	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	Turbo prop
Airframe Total Time:	7058.4 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	C126 installed	**Engine Model/Series:**	PT6A-42
Registered Owner:		**Rated Power:**	850 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:	17:00 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	8 miles
Lowest Ceiling:	Overcast / 1400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots / 28 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	110°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.47 inches Hg	**Temperature/Dew Point:**	4°C / 2°C
Precipitation and Obscuration:	Light - None - Rain		
Departure Point:	Dutch Harbor, AK (DUT)	**Type of Flight Plan Filed:**	
Destination:	Adak, AK	**Type of Clearance:**	IFR
Departure Time:		**Type of Airspace:**	Class E

Airport Information

Airport:	Unalaska DUT	**Runway Surface Type:**	Asphalt
Airport Elevation:	23 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	31	**IFR Approach:**	None
Runway Length/Width:	4500 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 2 None	**Latitude, Longitude:**	53.898887,-166.54499(est)

Administrative Information

Investigator In Charge (IIC):	Banning, David
Additional Participating Persons:	Bill Chaplin; LifeMed Alaska; Denver, CO Vince Hamblin; Aero Air LLC; Hillsboro, OR Paula Huckleberry; Federal Aviation Administration; Wasilla, AK Greg Clausen; AERO AIR LLC; Hillsboro, OR
Original Publish Date:	April 6, 2022 **Investigation Class:** 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100829