

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: May 4, 1949

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SEATTLE AIR CHARTER—SEATTLE, WASHINGTON, JANUARY 2, 1949**The Accident**

At approximately 2205,* January 2, 1949, a Douglas DC-3, NC-79025, owned and operated by Seattle Air Charter, an irregular air carrier, crashed and burned following an attempted takeoff from Boeing Field, Seattle, Washington. Eleven of the 27 passengers and 3 crew members received fatal injuries. The aircraft was destroyed.

History of the Flight

A group of Yale University students returning to school following their Christmas vacation arranged with William F. Leland, sole owner and operator of Seattle Air Charter, to transport them from Seattle to New Haven, Connecticut, January 2, 1949. Departure was delayed because a full crew was not available at 1800 as had been originally planned. At approximately 2100 a crew was organized, consisting of G. W. Chavers, pilot; K.A. Love, copilot; and W. F. Leland, third crew member.

The flight taxied to Runway 13 for takeoff at 2138 and held because ground fog conditions restricted the visibility below the one mile minimum required for takeoff. The flight maintained radio contact with the control tower which advised the pilots of the existing weather conditions on the field. When the flight had taxied from the parking ramp, the tower reported, "Boeing Field weather is clear, visibility, 1/2 variable to 1/4 mile in all quadrants." The flight asked if they could take off. The tower replied: "Roger. We will let you out as far as traffic is concerned. You are cleared into position to hold." A few minutes later, at 2145, the flight requested their weather minimums for takeoff and were told that they were ceiling 300 feet, and visibility one mile. To

this, the flight responded, "If we take off we will be in violation, won't we?" The tower answered, "Yes." Shortly after this conversation, the tower again reported the visibility which was at that time restricted to 1/8 mile.

After a period of 10 minutes during which time the flight continued to hold at the end of the runway, the tower remarked: "It appears we are getting a little break. Cleared into position and hold. We will have a clearance for you shortly." Immediately following, the flight's air route traffic control clearance was transmitted. Then, at 2201, the crew stated that they could see the four green range lights at the end of the runway, and that they were going to take off. These lights are located 5,700 feet from the approach end of runway 13, which is 7,300 feet in length. At 2204 the tower stated, "Cleared for take off report on top." At this time the weather as reported by the Weather Bureau was ceiling unlimited, thin obscurement, visibility one fourth of a mile, restricted by fog. The airplane began its take off to the south, and for approximately 1,000 feet it appeared normal to observers who could see the navigation lights of the airplane. It then began to swerve to the left, becoming airborne approximately 1,800 feet down the runway on a heading 35 degrees to the left of the runway. Shortly after leaving the runway, the left wing dropped and the tip dragged on the ground for a distance of 117 feet. The aircraft remained airborne for approximately 750 feet after leaving the runway, and then made contact with the ground in a landing attitude, tail wheel first. Upon contact with the ground, power to the engines was "cut". The aircraft rolled or skidded the remaining distance, approximately 700 feet, into a revetment hangar, immediately after which it was enveloped in flames.

As the tower watched the airplane's navigation lights, they realized that a

*All times referred to herein are Pacific Standard and based on the 24-hour clock.

crash was imminent and called the Boeing Field Fire Department which was located 1,300 feet south of the control tower, and 200 feet south of the revetment hangar into which the airplane crashed. The fire captain on duty heard the crash. He and 2 firemen, which comprised the duty crew that night, responded immediately, departing for the scene of the crash with all available equipment. This comprised a crash wagon and 2 pump trucks. The equipment arrived within a minute after the crash.

Investigation

It was found that the force of impact had completely crushed the nose of the aircraft and had telescoped it into the fuselage structure to approximately the position of the leading edge of the wing. Fire which immediately followed destroyed that portion of the fuselage forward of the main cabin door. During the fire fighting operation the wings and the aft portion of the fuselage were pulled from the rest of the wreckage, and this resulted in breaking all of the control cables. The landing gear was found in the down and locked position, and the flaps in the "up" position. Trim tab control settings in the cockpit indicated that all trim tab control surfaces had been in the neutral position at the time of takeoff. Engine switches were found in the "on" position. Eighty percent of the passenger seats were found broken from their floor attachments. All components of the aircraft were accounted for and no evidence of any structural or mechanical failure prior to impact was found.

Both engines were disassembled and inspected. This inspection revealed no indication that any of the internal working parts of the engines were not operating properly prior to the time of impact. Inspection of the master rod bearings revealed no evidence of over speeding on either engine. The disassembly of the engine accessories indicated that they were properly operating prior to the time of impact. Damage to the propellers, which were found in a low pitch position, showed that little power was being developed at the time of impact.

All the gyro instruments were removed from the wreckage and examined. It was found that all were clean and lubricated and were capable of normal operation before the accident. The directional

gyroscopic instruments showed that the airplane was on a heading between 90 and 95 degrees at the time of the crash.

During the day of January 2, while NC-79025 had been parked on the field without wing covers, snow fell from 1600 to 1700, leaving a deposit of 2 to 3 inches on the ground. The surface temperature at the beginning of the period was 39 degrees, but it fell below freezing by 1700. The first snow melted on contact with the aircraft and left a film of water on all its surfaces. With the lowering of temperature the water froze and the snow began to accumulate on the aircraft leaving a rough covering of frozen snow and slush.

The forecast for Boeing Field for the evening of January 2 indicated clear skies and visibility reduced to one mile by fog. It was expected that the fog would thicken causing ceiling and visibility to drop to zero by 2230. At 2015 patches of fog began drifting across the field, at which time the visibility was restricted to 1/16 of a mile.

Pilot Chavers had been briefed by the Weather Bureau at 1700 regarding the en route weather to Billings, Montana, the first refueling stop. This briefing indicated that with the possible exception of scattered snow showers the weather en route would be relatively good. At approximately 2100 Mr. Chavers was advised by the Weather Bureau that due to fog the local field conditions would remain variable with periods when both ceiling and visibility would be near zero. Between 2100 and the time of takeoff Mr. Chavers made three calls by telephone to the control tower for reports of visibility. At no time did he receive information that visibility on the field was in excess of one-half mile.

Three transport type aircraft, two scheduled and one non-scheduled, took off from Boeing Field, Runway 13, between 2130 and 2200. The pilots of the scheduled aircraft testified that the visibility at the time of takeoff was 1/4 to 1/2 mile variable. The crew of the non-scheduled airplane testified that the visibility was slightly over a mile at the time of takeoff. These pilots stated that the takeoffs were routine and no difficulty was experienced due to runway ice, aircraft ice, or restricted visibility. The ice on the runway was smooth with no ruts. It was also found that the Boeing Field lighting

system, including the runway lighting, was functioning normally the night of the accident. With a clear sky condition the takeoff visibility minimum for the scheduled carriers was 1/4 mile, and for the non-scheduled carriers one mile.

At approximately 1800 an attempt was made to remove the snow and ice from the airplane, by dragging a rope over the wings and the horizontal tail surface. This removed some of the snow but none of the ice. Then a high pressure water hose was used. Loose snow and slush were washed free by the process, but a coating of clear ice formed where the water was applied, and it was at this time that ice accumulated on the under surfaces of the wing. Both temperature and dew point were 29 degrees, and frost began to form on the iced surfaces of the airplane.

Emmett G. Flood, who had been obtained as one of the pilots to make the flight, arrived at the airport at approximately 1930 and examined the airplane. Because of the ice condition on the airplane, he refused to fly. According to Mr. Flood's statement, he returned home and, at approximately 2045, notified a CAA Aviation Safety Agent by telephone of the condition of the aircraft. According to the statement of the agent concerned, he received the information at home, at approximately 2150, after which he immediately notified his superior who resided nearby. During the time that he and his superior were conferring, they received notice that the accident had occurred.

Shortly after Mr. Flood left the field a third attempt was made to remove the ice from the aircraft by Leland, Chavers and Mr. Minor, a mechanic. This time an alcohol solution was applied to the wings and the tail surfaces of the aircraft. The mechanic testified that all ice was removed by this process; however, no attempt was made to remove ice on the under surfaces of the wings, and the mechanic did not examine this portion of the aircraft. At 2115 Mr. Chavers requested the advice of another pilot, a Mr. John Vineyard, concerning the effect of the ice on the aircraft. Mr. Vineyard examined the aircraft and then told Mr. Chavers that if he intended to fly the airplane that night to obtain plenty of air speed before taking off. Mr. Vineyard later stated that when he examined the airplane, which was just before takeoff, he found a layer of clear ice covering the underside of both wings and patches

of rime and clear ice on the top surfaces of the left wing. He also stated that he noticed heavy frost was forming rapidly on the top surfaces of the wings.

The maximum gross allowable takeoff weight for NC-79025 was 25,346 pounds. The average weight of the passengers as determined from the Yale University health records was approximately 160 pounds. Assuming the crew members to be the same weight, total weight of the passengers and crew would be 4,800 pounds. The weight of the fuel would be 3,814 pounds, and the weight of the baggage as shown by the passenger manifest was 533 pounds. The baggage was never weighed by any employee of Seattle Air Charter. Adding this weight to the empty weight of the aircraft, a total weight of 26,847 pounds is arrived at, which is 1,501 pounds greater than permissible takeoff weight. This overload reduced the margin of safety.

G. W. Chavers, age 33, held an airman certificate with a commercial pilot and instrument rating. He had a total of approximately 6,000 hours of flight time, over half of which had been obtained in multi-engine aircraft. Mr. Chavers had obtained his training in the United States Army Air Forces. His last physical examination had been passed January 6, 1948. The copilot, Kenneth A. Love, age 39, held an airman certificate with a commercial pilot and instrument rating. He had a total of approximately 3,000 hours of flight time. Mr. Love had also received his flight training in the Army Air Forces. His last physical examination had been passed September 24, 1948. The third member of the crew, the owner of Seattle Air Charter, William Frederic Leland, age 31, held an airman certificate with a commercial pilot rating. There were no recent company records obtained of his flight time or experience; however, CAA records indicated that he had 466 flying hours at the date of application for his commercial certificate which was February 14, 1945.

Analysis

As stated above, a witness who examined the airplane shortly before the attempted takeoff found a coating of ice on the bottom surfaces of the wings. This witness also stated that he found patches of ice and frost on the top surfaces of the left wing. Formation of ice and frost on the wing would account

for the failure of the flight to accomplish a normal takeoff, for ice and frost in addition to increasing the weight of the airplane, which was already 1,500 pounds over permissible takeoff weight, would tend to decrease the lifting qualities of the wings. It is also possible that the pilot did not have sufficient visibility to hold the airplane on a straight course; however, his pilot experience included a reasonable amount of instrument training, and in view of this it can be reasonably expected that he would be able to continue the takeoff successfully by reference to instruments if all outside visible references were lost. Accordingly, the most logical explanation of this accident is that the airplane did not become normally airborne because of the ice and frost which is known to have existed on the wings.

Certainly the accident cannot be attributed to any mechanical failure in the airplane for all the evidence disclosed by the investigation indicated that the aircraft and all of its components were operating normally at the time of the crash.

Furthermore, this accident cannot be attributed to the manner in which the tower personnel dispatched their duties. The investigation showed that the tower continuously advised the flight of existing weather conditions on the field and that they adequately discharged their duties in providing traffic separation for arriving and departing aircraft. According to existing Civil Air Regulations, no other acts are required of, or duties imposed upon, tower personnel, and the pilot in command of the aircraft is solely and directly responsible for its safe operation.

Findings

Upon the basis of all available evidence the Board finds that:

1. The carrier, crew, and aircraft were properly certificated.
2. At the time of takeoff the airplane in addition to the weight of the ice, weighed approximately 26,847 pounds, which was 1,501 pounds in excess of its permissible take-off weight.

3. At the time of takeoff ice covered the bottom surfaces of both wings, and patches of ice and frost were on the top surface of the left wing.

4. At the time of takeoff official weather at Boeing Field was ceiling unlimited, thin obscurement, visibility restricted to one-fourth of a mile by fog.

5. The pilot reported to the tower that he could see green range lights at the other end of the takeoff runway, after which he was cleared for takeoff by the control tower. The green lights to which the pilot referred were 5,700 feet from the approach end of Runway 13, which is 7,500 feet in length.

6. The airport lighting system including that for the runway used was functioning normally.

7. After the airplane completed approximately 1,800 feet of the takeoff roll, it became airborne on a heading of 35 degrees to the left of the takeoff runway.

8. The left wing tip dragged the ground for a distance of 117 feet and the aircraft remained airborne for a distance of approximately 750 feet after which it made contact with the ground in a landing attitude.

9. Power to both engines was cut after the airplane touched the ground. It then crashed into a revetment hangar, and was immediately enveloped in flames.

10. No indication of any mechanical or structural failure in the aircraft or any of its components was found.

Probable Cause

The Board determines that the probable cause of this accident was the attempt to take off in an airplane which had formations of ice and frost on the surfaces of the wings.

BY THE CIVIL AERONAUTICS BOARD:

/s/ JOSEPH J. O'CONNELL, JR.

/s/ OSWALD RIAN

/s/ JOSH LEE

/s/ HAROLD A. JONES

/s/ RUSSELL B. ADAMS

Supplemental Data

Investigation and Hearing

Civil Aeronautics Board, Region VII, was notified of the accident at approximately 2215, January 2, 1949, by CAA communications. An investigation was immediately initiated in accordance with provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. Investigators from the Civil Aeronautics Board Regional Office arrived at the scene of the accident at approximately 2250, January 2, 1949. Public hearing was ordered by the Civil Aeronautics Board and held in Seattle, Washington, January 18, 1949, in the Federal Court House.

Air Carrier

Seattle Air Charter, an unincorporated organization, was solely owned and operated by William F. Leland, Seattle, Washington. Seattle Air Charter held a letter of registration 7-85, dated August 8, 1947, giving the authority to operate as an irregular air carrier. It held a non-scheduled air carrier operating certificate issued June 4, 1947, No. 7-73. It was authorized to carry both passengers and cargo.

Flight Personnel

Captain G. W. Chavers, age 33, held an airman certificate with a commercial pilot and instrument rating. He had a

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total of approximately 6,000 hours of flight time, over half of which had been obtained in multi-engine aircraft. His last CAA physical examination was on January 6, 1948. Copilot Kenneth A. Love, age 39, held an airman certificate with a commercial pilot and instrument rating. He had a total of approximately 3,000 hours at the time of the accident. His last CAA physical examination was on September 24, 1948. William Frederic Leland, age 31, held airman certificate with a commercial pilot rating. He had a total of 466 flying hours as of February 14, 1945.

The Aircraft

NC-79025 was a Douglas DC-3C. The aircraft was manufactured September 1943, and was certificated by the Civil Aeronautics Administration September 11, 1946. On April 19, 1948, the aircraft received a required annual inspection and at that time was approved as airworthy. On December 22, 1948, a 100-hour inspection was accomplished by a certificated mechanic. It had been flown 5,419 hours since its manufacture, and was equipped with two Pratt and Whitney R-1830-90D engines and two Hamilton Standard Hydromatic propellers. The company files of Seattle Air Charter did not contain any current aircraft, engine, or propeller records.

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