

CIVIL AERONAUTICS BOARD
ACCIDENT INVESTIGATION REPORT

Adopted: January 12, 1948

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SLICK AIRWAYS, INC.—BURBANK, CALIFORNIA—SEPTEMBER 17, 1947

The Accident

A Slick Airways' C-46 airplane, NC-59495, a cargo flight, crashed while attempting a landing at the Lockheed Air Terminal, Burbank, California, at 1112,¹ September 17, 1947. No one was injured, though the aircraft received major damage.

History of the Flight

The flight departed from Denver, Colorado, at 0504, September 17, 1947, with a crew of two, and loaded with 9,615 pounds of cargo and 951 gallons of fuel. From data studied in the U. S. Weather Bureau office, and from the information received from the forecaster on duty Captain Gilbert R. Clark and First Officer John W. Neitert prepared their flight plan, computing their time en route to Burbank, California, via Grand Junction, Colorado, and Las Vegas, Nevada, to be 4 40 hours. Their fuel supply of 951 gallons they computed to be equivalent to 6 45 hours of flight on the basis of an average head wind of 30 miles per hour. Palmdale, California, was designated as the alternate airport.

After take-off the engines were reduced to 80 percent power (35" hg-2300 rpm) for climb to the assigned altitude of 17,000 feet. About 25 minutes later flight altitude was reached, and power reduced for cruise. Head winds with unexpected velocities of approximately 50 miles per hour were encountered from Denver to Las Vegas, which resulted in the ground speed being reduced to an average of about 148 miles per hour. The flight flew over Las Vegas at 0916. Four hours and 16 minutes of the estimated time of 4:40 hours to Burbank had been consumed.

Just before reaching Las Vegas, however, a distance of 268 miles from Burbank, Captain Clark stated that his fuel quantity gauges indicated that he had

360 gallons of fuel remaining. Since he believed this to be sufficient to reach destination, he did not land at Las Vegas which was generally used as a fueling stop for Slick Airways. From Las Vegas to Palmdale, lighter winds were encountered resulting in a ground speed averaging 180 miles per hour. Palmdale was flown over at 1025, at which time the aircraft had been in the air a total of 5 hours and 18 minutes. Three minutes after passing over Palmdale, which was clear, the left engine fuel pressure dropped to 3 pounds, the red fuel warning light came on, and the left engine stopped. Fuel selector valves were changed, and as a result power was restored to the left engine. Captain Clark suspected a fuel leak. He inspected the aircraft for visible loss of fuel or fire, found none, and continued on to Burbank.

As the flight approached Newhall, California, Burbank reported a ceiling of 1,600 feet with visibility of two and one-half miles. The flight was instructed by the Los Angeles Airways Traffic Control Center to hold on the northwest course of the Burbank range, and advised that the approach clearance into Burbank could be expected at approximately 1052. Captain Clark informed the Burbank control tower that he was losing fuel and wanted to land as soon as possible, however, he declined to declare an emergency. Shortly after this, the left engine stopped for the second time, but power was again restored by changing the positions of the fuel selector valves. At 1056, approach clearance into Burbank was given, and at 1058, the flight reported inbound over the Chatsworth fan marker, approximately 14 miles from the Lockheed Air Terminal.

The ceiling over Burbank had by this time lowered to 1,000 feet, and rain showers had reduced visibility to about one mile. As the flight descended below 1,600 feet only intermittent bursts of power could be secured from the left

¹All times referred to herein are Pacific Standard and based on the 24-hour clock.

engine. The "letdown" was continued, the Burbank radio range station and the Lockheed Air Terminal were passed. Upon completion of a right turn to return to the range station the right engine stopped, and the propeller was immediately feathered.

At an altitude of 200 to 400 feet, Captain Clark recognized almost immediately underneath him a hangar on the Lockheed Air Terminal. He executed a sharp right turn of approximately 270 degrees, and landed on the north-south taxi way about 400 feet before crossing Runway 7, a distance of approximately 1,900 feet from the south boundary of the airport. Brakes were applied, but the aircraft could not be brought to a stop within the airport boundaries. It came to rest only after skidding across a highway and railroad line adjacent to the south boundary of the airport.

Investigation

Though the aircraft suffered major damage it remained intact, permitting a thorough and detailed inspection. The damage resulting from the crash was largely confined to the lower part of the fuselage, wing flaps, engine nacelles, landing gear, and propellers. The fuel tanks were found to be completely dry. No mechanical failures or malfunctions were found in the fuel system or in any part of the aircraft or engines. Tests were made of the rear tank fuel gauges which indicated the maximum error for the right rear tank gauge to be a plus 22.5 gallons and the maximum error for the left rear tank gauge to be a minus 27.5 gallons. In addition to the inspection of the airplane, the aircraft's historical and maintenance records were examined. These records were found entirely in order. According to the fuel consumption data supplied by the company, NC-59495 consumed approximately 200 gallons per hour in climb and 151 gallons in cruise. All cargo was examined and weighed at the scene of the accident. It was found that the aircraft had been properly loaded prior to its take-off from Denver.

Of all United States Weather Observation stations located on Red Airway No. 6 only those at Grand Junction, Colorado, and at Las Vegas, Nevada, report winds aloft. Stations located at Eagle,

Colorado, Hanksville, Bryce Canyon, and St. George, Utah, report only surface observations. These stations have surrounding them, within a radius of 30 miles, terrain which towers 2,000 to 6,000 feet above them. The wind forecasts available for this particular flight issued by the Salt Lake Forecast Center were 30 to 45 miles per hour, occasionally 55, from 320 degrees for all "flight levels." The winds forecasted by the Los Angeles U. S. Weather office included winds only up to 15,000 feet. From 10,000 to 15,000 feet, these were from 210 degrees at 30 miles per hour. No winds were reported or forecasted for altitudes above 15,000 feet.

The 500 and 700 millibar charts indicated that at altitudes from 14,000 to 17,000 feet, head winds averaging 30 to 36 miles per hour would be encountered over the route.

All flights flown by Slick Airways are cargo flights. No revenue passengers are carried. Every pilot hired by Slick, whether co-pilot or captain, must hold an effective airline transport pilot rating and must have not less than 2,000 hours total flying time, 1,000 of which must be as first pilot in multi-engine aircraft of 1200 horsepower or better. Training consists of a tour of duty in Chicago where the new pilot is assigned station duties, and taught the procedures and policies of the company. The pilot is then assigned as a third member of a flight crew for a minimum of three trips, in order that he may familiarize himself with company flying procedures. The third part of the training consists of flying as first officer until such time as the company is able to check the new pilot out as a captain. Each first officer is given a flight check every 30 days by the captain to whom he is assigned. Each new captain is given a minimum of 60 hours student captain time, during which time he is under the supervision of a check pilot. After becoming a captain he is given a flight check on instruments and route proficiency every 90 days.

Captain Clark, age 27, was employed by Slick Airways February 1, 1946. Previously he had flown for Pan American Air Ferries, and for the Army Air Transport Command. At the time of the accident, he had a total of 3,311 hours, 1,201 of which were in C-46 type equipment. He holds airman certificate 83605

with an airline transport pilot rating. Captain Clark completed the training as outlined above. He was given his last instrument and route check August 2, 1947, at which time he was found qualified to fly as a captain for Slick Airways

First Officer Neitert, age 27, was employed by Slick Airways March 4, 1947. He had previously flown for the Army Air Forces and for Western Air Lines. At the time of the accident, he had a total of 3,422 hours, 258 of which were in C-46 type aircraft. Mr. Neitert holds airman certificate 311125 with an airline transport pilot rating. He accomplished his last instrument and route check September 2, 1947. Mr. Neitert had also completed the training as outlined above and was found qualified to fly as a pilot for Slick Airways.

Discussion

Twenty-five minutes of the flight time (4 16 hours) to Las Vegas were spent in the climb out of Denver to the initial flight altitude of 17,000 feet. At the rate of 200 gallons per hour, 84 gallons of fuel were used in climb. For the remaining time of 3 51 hours to Las Vegas at the rate of 151 gallons per hour, 559 gallons were consumed, making the total fuel consumption to Las Vegas 643 gallons. This would have left Captain Clark 308 gallons of fuel to reach Burbank, or in terms of time 2 hours and 2 minutes of flight remaining. A distance of 268 miles remained from Las Vegas to Burbank. If Captain Clark had held his average ground speed of 148 miles per hour, one hour and 59 minutes at best would have been required to reach Burbank without allowance for possible delay in obtaining an approach clearance to the airport. This would have left a reserve of 16 gallons of fuel, sufficient for only 3 minutes flying time. Actually, lighter head winds were encountered from Las Vegas to Burbank which permitted Captain Clark to hold for a period of approximately 10 minutes before starting his "letdown" to the Lockheed Air Terminal. By company regulation he was required to have at least 100 gallons of fuel at the time of landing. Since instrument conditions existed at Burbank, he was required by Section 42.33 of the Civil Air Regulations to have sufficient fuel to fly from Burbank back to his alternate,

Palmdale, and still have a reserve of 45 minutes of fuel remaining.

Had Captain Clark had on board the amount of fuel which he stated was indicated by his fuel gauges, 360 gallons, he would have had an additional 52 gallons of fuel or 21 minutes of flight. Even this amount would not have permitted him to proceed to Burbank and land with the required fuel reserve, nor would it have permitted him to proceed to Burbank with any degree of safety considering holding time at Newhall because of instrument conditions. Had Captain Clark computed his fuel consumption based on time of flight and the company's fuel consumption data, he would have landed at Las Vegas according to the directions he had received from his company. His failure to do so, or to make any precautionary landing at airports en route so as to provide for a safe fuel reserve before continuing into Burbank, was the direct cause of the accident.

While it is apparent that Captain Clark could have determined the velocity of the winds encountered by comparing his ground speed to his true air speed, the fact remains that he might have landed at Las Vegas instead of continuing on to Burbank had he known before take-off that winds in excess of 50 miles per hour would be encountered. This information was not available from any U. S. weather reporting station. In fact, the information given from the Salt Lake Forecasting Center "for all flight levels" was so indefinite as to be of little value to a pilot planning a flight. Likewise, the forecast from the Denver and Los Angeles weather forecasting centers included wind information only to the 15,000 foot level. In view of the fact that this flight was planned at 17,000 feet, and that many flights over this route are now at 19,000 feet and above, it would seem that forecasted winds should be given up to and including 25,000 feet.

Of the two weather stations which report winds aloft on Red Airway No. 6, only Grand Junction is a "RAWIN" station.² However, Grand Junction did not report winds above 15,000 feet. Las Vegas is able to report winds only to altitudes which the observation balloon,

²A "RAWIN" station employs radar to follow the target balloon after it has been lost from vision in the overcast.

at night with an attached light, can be observed visually.

A pilot to have full and complete information concerning wind requires the information contained in weather forecasts, in the millibar or constant pressure charts, and in the observations taken by wind reporting stations. At the time of the accident, the forecast and reporting stations did not furnish complete wind information for flights made at altitudes in excess of 15,000 feet. This was brought to the attention of the Chief, U. S. Weather Bureau by the Civil Aeronautics Board's meteorologist. The Board has since been advised that on October 31, 1947, instructions were issued to the forecast centers to include in their regular forecasts winds aloft data at 20,000 feet MSL, which the U. S. Weather Bureau considers a satisfactory sample of the winds from 18,000 to 25,000 feet. In addition, the U. S. Weather Bureau during the month of January 1948, will include in its forecasts winds aloft data at 20,000, 25,000, and 30,000 feet for every five degree square of longitude and latitude in the continental limits of the United States. It is planned that this service will be continued if the Weather Bureau finds that it serves a useful purpose.

Findings

On the basis of all available evidence the Board finds that

1. The aircraft was properly certificated.
2. No structural or mechanical failure occurred in the aircraft or any of its components prior to the time of the crash.
3. With the exception of "constant pressure charts" no weather data at altitudes of 15,000 to 17,000 feet, the intended altitudes of flight, was available to the flight crew prior to the

time of their take-off from Denver, Colorado.

4. Head winds of unexpected velocities were encountered en route which resulted in an average ground speed of 148 miles per hour instead of the ground speed of 170 miles per hour used in the flight plan to estimate time en route.

5. During the course of the flight the crew made no computation of fuel consumed based on time in the air and on the company's fuel consumption data.

6. The flight encountered instrument weather conditions over the Burbank, California area, and was required to wait for an instrument approach clearance to the Lockheed Air Terminal for approximately 10 minutes. No emergency, however, was declared.

7. At Denver the aircraft held 951 gallons of fuel which provided for 5 57 hours flight time based on fuel consumption at the rate of 200 gallons per hour in climb and 151 gallons per hour in cruise.

8. After the flight had been airborne for a period of 6 08 hours and had reached the vicinity of Burbank, California all fuel was exhausted, and a crash landing was executed on the Lockheed Air Terminal.

Probable Cause

The Board determines that the probable cause of this accident was the exhaustion of fuel prior to landing at Burbank, California, due to failure of the pilot to compute properly his fuel consumption, and to provide for a safe fuel reserve.

BY THE CIVIL AERONAUTICS BOARD

/s/ OSWALD RYAN

/s/ HARLEE BRANCH

/s/ JOSH LEE

Supplemental Data

Investigation and Hearing

Notification of this accident was relayed through the non-scheduled operating division of the Civil Aeronautics Administration's VI Regional Office to the Chief of Region VI of the Civil Aeronautics Board. An investigation was immediately initiated in accordance with the provisions of section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was held in Santa Monica, California, October 1, 1947.

Air Carrier

Slick Airways was incorporated in the State of Delaware. The general offices are in San Antonio, Texas, the main operating and maintenance base is located in Burbank, California. Slick

Airways is a non-scheduled carrier and transports cargo only. A non-scheduled operating certificate covering the company's activities was issued by the CAA's Fourth Regional Office in Fort Worth, Texas.

The Aircraft

NC-59495 was a Curtiss C-46 airplane. It had a total of 3,811 flying hours since the date of manufacture. The engines were Pratt & Whitneys, R-2800-75. The left engine had a total of 213 hours and the right engine 617 hours, both since new. The left propeller had a total of 3,730 hours since new, 618 hours since overhaul, the right propeller had a total of 3,749 hours, and 618 hours since overhaul.