

C I V I L A E R O N A U T I C S B O A R D
ACCIDENT INVESTIGATION REPORT

Adopted: May 2, 1957

Released: May 9, 1957

CANADIAN PACIFIC AIRLINES, LTD., DOUGLAS DC-6B, CF-CUP,
COLD BAY, ALASKA, AUGUST 29, 1956

The Accident

Canadian Pacific Airlines Flight 307, a Douglas DC-6B, CF-CUP, crashed following a missed approach at Cold Bay Airport, Cold Bay, Alaska, August 29, 1956, at approximately 2045 B. s. t.^{1/} Eleven passengers, including one infant, and four crew members were fatally injured. Three passengers and four crew members received injuries of varying degree. The aircraft was destroyed by impact and fire.

History of the Flight

Flight 307, a regularly scheduled international flight, departed Vancouver, British Columbia, Canada, at 1347 (1747 Pacific daylight time), en route to Hong Kong, China, with a refueling stop at Cold Bay, Alaska, and an intermediate stop at Tokyo, Japan. On board the aircraft were 14 passengers and a crew of eight, consisting of Captain Thornton A. Tweed, Captain Phillip D. Iverson, First Officer Robert Love, Navigators William R. Hunter and William B. Short, and Stewardesses Evelyn Lee, Anita Wong, and Dolores R. Jordan.

An instrument flight plan, filed with Vancouver Airway Traffic Control, specified an altitude of 11,000 feet via airways Green 10 and Amber 1 to Port Hardy, 10,000 feet via Great Circle from 100 miles out of Port Hardy to 160 degrees

^{1/} All times referred to in this report are Bering standard and based on the 24-hour clock; all altitudes are mean sea level; distances are in nautical miles unless otherwise stated.

W. longitude, and 12,000 feet direct to Cold Bay. The estimated time of flight was seven hours and 16 minutes, with Anchorage and King Salmon, Alaska, as destination alternates and Vancouver as a return alternate. The clearance issued was in accordance with the above flight plan.

Routine hourly position reports were received from the flight indicating that it was making good its track slightly ahead of the estimated time. The flight reported 100 miles out at 2011, estimating Cold Bay at 2036. It reported being over the Cold Bay range station outbound on a standard instrument approach at 2035, and at 2042 as completing a procedure turn and proceeding inbound. This was the last transmission from the flight.

At approximately 2045 the aircraft was observed to descend from the overcast north of the airport for a landing on runway 14 and cross the field at low altitude to the intersection of the two runways. At this point a shallow left turn was started and the aircraft went out of sight southeast of the airport. Very soon thereafter fire was observed in that direction.

The 2045 Cold Bay weather observation was: Indefinite ceiling, 500 feet obscured; visibility 1-1/2 miles; light drizzle; fog; temperature 46 degrees; dewpoint 46; wind west-northwest at 20 knots; altimeter setting 29.89 inches.

Investigation

Examination of the wreckage and ground marks disclosed that the aircraft first struck the ground at an elevation of 10 feet on a heading of approximately 40 degrees magnetic and 4,300 feet east-southeast of the approach end of runway 26. The physical evidence indicates that at the time of impact the aircraft was descending in a slightly nose-down attitude with the left wing down about 15 degrees. Computed ground speed at impact, based on propeller governor settings and propeller cuts in the ground, was approximately 186 knots. The wreckage area, approximately 500 feet by 1,500 feet, showed the scattering of components to bear a general heading of 40 degrees magnetic.

Examination of the aircraft wreckage disclosed no evidence, as far as could be determined, of an inflight structural failure of the airframe or malfunction of its systems.

There was no indication of inflight structural failure or malfunction of the engines, propellers, or their related accessories. Examination of the propeller and propeller governors indicated that the blades of all propellers were at a blade angle of approximately 40 degrees and that the engines were operating at an average speed of 2,460 r. p. m. at the time of impact. Computations show that each of the four engines was delivering approximately 1,385 horsepower at impact, which is slightly more than cruise power.

The Canadian Pacific Operations Manual, according to testimony of the chief pilot, specifies that, in the case of a missed approach, METO (maximum except takeoff) power is applied, the gear is retracted, and the flaps are retracted to 20 degrees for the climbout. METO power of the aircraft involved was 1,900 h. p. and 2,600 r. p. m.

The landing gear and wing flaps were determined to be in the up, or retracted, positions at the time of impact.

Ground witnesses testified that the aircraft, during its pass over runway 14, was flying at an estimated altitude of 100-200 feet above the ground, with the landing gear down, and landing lights on.

The company dispatcher, standing on the ramp east of runway 14, observed Flight 307 break out of the overcast, appear to be making a landing, and then he heard power applied. He next observed the aircraft turn to the southeast over the intersection of runways 14 and 26 in a shallow climb from its estimated height over the runway of 50 to 75 feet. The dispatcher held a microphone for VHF radio contacts with the flight and was on the point of asking if the pilot wanted the lights switched to runway 26 when he saw fire at ground level.

The surviving stewardess testified that she saw the runway lights a short time before the crash. None of the crew survivors recalled any aircraft operating difficulties prior to the impact. One flight crew member, who was resting

in a crew sleeping compartment, stated that the approach from over the range station did not seem as smooth as usual, the power was changed frequently during the descent, and that the power applied for a missed approach seemed less than normal. He also said that he thought there was a feeling of "sink" just before the ground contact. The duty navigator, who was unable to see either outside or the two pilots because of a blackout curtain between his seat and the pilots, testified that he overheard Captain Tweed say, "No, Phil" when power was being applied over runway 14. He also observed a reading of 160 feet on his altimeter at this time. This altimeter was set at 29.92 inches, which produced a reading approximately 30 feet higher than true.

The Cold Bay Airport is located on the Alaskan Peninsula, 572 miles southwest of Anchorage, Alaska. Its elevation is 93 feet. The two runways, 14-32 and 26-8, are 7,500 and 5,000 feet in length, respectively, and their intersection is on the south side of the airport. The control tower was not operative and there was no CAA Communications Station available. There were two private air-ground communications stations on the airport operated by Reeve Aleutian Airways and Northwest Orient Airlines. Canadian Pacific Airlines utilized the facilities of Northwest to relay position reports, and to receive traffic clearances, weather information, and local traffic conditions.

Navigational facilities in operation at Cold Bay consisted of a low frequency range, without voice, equipped with

a VHF station location marker. The range is located 2.2 miles northwest of the airport. A privately owned (Reeve) nondirectional beacon is located off the approach end of runway 14 and is operated on request only. Such request was not made by Flight 307. The low frequency range was flight-checked following the accident and found to be operating within allowable limits.

The airport is equipped with a rotating beacon and high-intensity runway lights that can be operated on only one runway at a time. During Flight 307's approach, the high-intensity runway lights were lighted on runway 14, as were the high-intensity approach lights to the runway. Runway 14 lights, and all other lights, were reported to have operated normally the evening of August 29, 1956. In the vicinity of the airport, and in the quadrant in which the aircraft was flying when the accident occurred, there were few, if any, lights which would assist in orientation.

The ceiling and visibility landing minimums for Canadian Pacific Airlines DC-6 flights at Cold Bay are 400 feet and one mile for straight-in approaches at night, and 500 feet and 1-1/2 miles for circling approaches.

Captain Iverson, who occupied the left seat at the time of the accident, had been qualified as a captain on Canadian Pacific Airlines domestic lines for over 10 years prior to assignment to the Overseas Division. He had made a number of round trips over the Vancouver-Hong Kong route including

landings at Cold Bay, and the subject flight was in preparation for his checkout as captain on this route. His total flight time was 12,782 hours, which included 465 hours in DC-6 equipment. Company records showed that Captain Iverson was qualified according to company policy and Canadian regulations as a captain in the DC-6B. At the time of the accident he was in the process of qualifying over the Vancouver-Hong Kong route. Company policy required that this include several flights under the supervision of a captain already qualified. This was being accomplished under Captain Tweed on this flight.

The weather briefing received by the crew of Flight 307 at Vancouver included a forecast for Cold Bay for the period 1200 to 2200, August 29, 1956, as follows: Ceiling 800 feet, overcast; visibility 3 miles; light drizzle and fog; wind west 16; after 2000, ceiling 1,200 feet, overcast; visibility 7 miles; wind northwest 12.

The actual weather en route appears to have been quite close to that forecast at the briefing, with the exception of the lower ceiling at Cold Bay. The 2024 Cold Bay report was: Indefinite ceiling, 500 feet, sky obscured; visibility 1-1/2 miles; light drizzle, fog; temperature 47; dewpoint 46; wind west-northwest 21; and altimeter setting 29.89. This report was received by the flight before the arrival at Cold Bay.

The letdown for the approach to Cold Bay was through an overcast and the ceiling and visibility at that time were reported as 500 feet and 1-1/2 miles. The surface wind was reported west at 20 knots, and terrain effects may have produced light to moderate turbulence at altitudes below 2,000 feet.

Analysis

It is probable that the intention of the pilot during the approach was to land on runway 14, a straight-in landing from the inbound overheading of the range station. The breakout, after descending through the overcast, may have been too close in and high and these factors, together with excessive groundspeed due to a quartering tailwind, may have caused the captain to decide to go around.

Whether the flight intended to turn and climb to 2,700 feet on the north leg of the Cold Bay range, as the missed-approach procedure prescribes, or to circle under the 500-foot ceiling and land on another runway is not known. However, the company dispatcher, who observed the aircraft and was in radio contact with it, thought the decision was for the latter course as he was about to query the flight if they wanted the other runway (26-8) lighted when the crash occurred.

Considering that very little altitude was gained after the application of power it is probable that a circling approach had been decided upon when the left turn from runway 14 was made.

Since the wing flaps during the circling approach would be extended 20 degrees, and since they were found in the fully retracted position, it is believed that they were retracted shortly before impact. Fully retracted wing flaps at this time would explain the feeling of "sink" experienced by the off-duty flight crew member.

The Board believes that the airspeed of the aircraft at the time the flaps were retracted was approximately 130 to 140 knots. This is supported by several facts. According to company procedure it is normal on the downwind leg of an approach to a runway for the aircraft to fly at an airspeed of approximately 140 knots with wing flaps extended 20 degrees. Since the subject aircraft was in a clean configuration (gear and flaps up) immediately prior to the accident, with a tailwind of approximately 20 knots, it would be reasonable to assume that the speed of the aircraft increased during the final descent. In addition, when the aircraft passed over runway 14 it was in landing configuration. Since only slightly better than cruise power was applied at this time, and as the distance to the point of impact was approximately one mile, it is unlikely that the speed of the aircraft would have been much greater than 140 knots when the flaps were retracted.

It is evident that the aircraft struck the ground while descending in a slight left turn and while all four engines were not operating at the prescribed power settings necessary to execute a missed-approach procedure.

Findings

On the basis of all available evidence, the Board finds that:

1. The carrier, the aircraft, and the crew were currently certificated by the Department of Transport of Canada.

2. The gross load of the aircraft was within allowable limits.

3. The ceiling and visibility were at or near the carrier's minimums for Cold Bay.

4. There was no structural failure or malfunctioning of the aircraft or its components, so far as could be determined, prior to ground impact.

5. A quartering tailwind of 20 knots was present for a landing on runway 14.

6. A circling approach was initiated during which the wing flaps were prematurely fully retracted.

7. The flap retraction, without a compensating increase in power, or change in attitude, or combination thereof, caused a substantial loss of lift resulting in a loss of altitude.

Probable Cause

The Board determines that the probable cause of this accident was the full retraction of the wing flaps at low altitude during a circling approach without necessary corrective action being taken by the crew.

BY THE CIVIL AERONAUTICS BOARD:

/s/ JAMES P. DURFEE

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

/s/ G. JOSEPH MINETTI

/s/ LOUIS J. HECTOR

S U P P L E M E N T A L D A T A

Investigation and Hearing

The Civil Aeronautics Board's Anchorage, Alaska, office was notified of the accident at approximately 1030 A. s. t., August 29, 1956. 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 ordered by the Board, and was held in Seattle, Washington, on November 26, 1956.

Air Carrier

Canadian Pacific Airlines, Ltd., is incorporated in the Dominion of Canada, and maintains its principal place of business at Vancouver, B. C., Canada.

The company possesses an Air Transport Board license and an operating certificate issued by the Canadian Department of Transport. It also possesses a Foreign Civil Aircraft Flight Permit issued by the United States Government authorizing the carriage of persons, property, and mail over the route described in this report.

Flight Personnel

Captain Thornton A. Tweed, age 33, was employed as a pilot by Canadian Pacific Airlines on July 1, 1942. He held airline transport license No. 444, issued March 10, 1953. Captain Tweed had, according to company records, total pilot time of 9,522 hours, of which 2,906 were acquired in DC-6B aircraft. His last instrument and en route checks were given

May 15, 1956, and May 22, 1956, respectively. His last physical examination was taken on April 11, 1956. He had had 59:48 flight hours in the 30 days preceding the subject flight.

Captain Phillip D. Iverson, age 37, was employed as a pilot by Canadian Pacific Airlines on May 1, 1942. He held airline transport license No. 478, issued March 28, 1953, by the Department of Transport of Canada. This license was endorsed by the Department of Transport for DC-6B aircraft. Captain Iverson had, according to company records, total pilot time of 12,782 hours, of which 465 were acquired in DC-6B aircraft. His last instrument and en route checks were given May 17, 1956, and June 27, 1956, respectively. His last physical examination was taken on July 23, 1956. He had had 74:49 flight hours in the 30 days preceding the subject flight.

First Officer Robert Love, age 28, was employed as a pilot by Canadian Pacific Airlines on February 22, 1955. He held airline transport license No. 734, issued August 7, 1956. He had, according to company records, total pilot time of 3,471 hours, of which 938 were in DC-6B aircraft. His last en route and instrument checks were given November 5, 1955, and July 16, 1956, respectively. His last physical examination was taken on July 16, 1956. He had had 70:51 flight hours in the 30 days preceding the subject flight.

Navigator William R. Hunter, age 32, was employed by Canadian Pacific Airlines on September 26, 1949. He held flight navigator license No. 53, issued June 24, 1953. His

total flying hours were 1,195. The date of his last physical examination was February 1, 1956.

Navigator William B. Short, age 30, was employed by Canadian Pacific Airlines on June 4, 1956. He held flight navigator license No. 80, issued August 13, 1956. He had had 230 flying hours with Canadian Pacific Airlines. His last physical examination was on June 6, 1956.

Stewardess Evelyn Lee, age 26, was employed by Canadian Pacific Airlines on October 29, 1951, and began duty on overseas flights April 29, 1953.

Stewardess Anita Wong, age 25, was employed by Canadian Pacific Airlines on August 23, 1954. She had been on duty with the Overseas lines since that time.

Stewardess Dolores R. Jordan, age 25, was employed by Canadian Pacific Airlines on August 2, 1954, and started on duty on overseas flights April 1, 1956.

The Aircraft

Douglas DC-6B, CF-GUP, serial number 43843, was purchased new from the manufacturer February 4, 1953. Total time on the aircraft at the time of departure from Vancouver was 10,507 hours, with zero time since the last No. 35 inspection and preflight. The aircraft was equipped with four Pratt and Whitney R-2800-CB17 engines, and four Hamilton Standard, model 43E60, propellers. The propeller blades were model 6895-E8. Time on the four engines since overhaul was between 600 and 1,122 hours, the approved time between overhauls being 1,400 hours. Time on the four propellers since overhaul was between 450 and 1,651 hours.