Canadian Department of Transport

Civil Aviation Branch

Aircraft Accident Investigation Division

REPORT

Boeing 707-138B N791SA

Construction Number 17698

(Ex Qantas VH-EBC)

07 February 1968

Vancouver International Airport, Canada

ACCIDENT REPORT

Boeing 707, Vancouver International Airport, February 7th 1968.

The following extracts are taken from the official report issued by the Canadian Department of Transport, Civil Aviation Branch, Aircraft Accident Investigation Division.

SYNOPSIS

The aircraft was being operated by Standard Airways Inc., a United States Supplemental Carrier, as scheduled Canadian Pacific Airlines Flight 322 from Honolulu, Hawaii to Vancouver BC, Canada. During the landing the aircraft ran off the runway and collided with parked aircraft, vehicles and two buildings. There were 4 Standard Airways flight crew members, 5 Canadian Pacific Airlines (CPAL) cabin attendants and 52 passengers on board. One cabin Attendant and an airport employee were killed. One flight crew member and 17 passengers were injured.

The weather reports for Vancouver, before and after the accident, showed the visibility was zero. The evidence indicated visual reference was lost after the flare and prior to touch-down.

HISTORY OF FLIGHT

The aircraft departed Vancouver at 1812 hours 6 February 1968 and landed at Honolulu at 2349 hours. The flight time was 5 hours and 45 minutes including ground taxi time. There were no mechanical discrepancies reported at Honolulu and routine servicing was completed under the supervision of the flight engineer.

During the pre-flight preparation a message addressed to the Captain from CPAL dispatch in Vancouver, advised that there was an increased risk of fog at Vancouver and Abbotsford and suggested that Calgary be used as an alternate, with 30 minutes holding fuel at Vancouver.

The aircraft became airborne at 0117 hours and proceeded as flight planned with normal communications, position reports and weather surveillance. At about 0640 hours communications was established between the aircraft and Vancouver Air Traffic Control (ATC) Centre, who were advised that aircraft would be over Tyee Intersection at 0544 hours. At about 0542 hours ATC provided the current Vancouver weather report, which was: ceiling partially obscured, visibility 1/8 mile in fog and smoke, temperature 27 degree F, dew point 25 degree F, air calm, altimeter setting 30.27 in Hq. Flight 322 was also advised that the runway 08 was in use and that the indicated Runway Visual Range (RVR) was less than 1000 feet. The flight crew acknowledged this information; and on request were advised that the Abbotsford weather was: sky clear and visibility 30 miles.

The Captain discussed the weather situation at Vancouver with CPAL dispatch and a decision was made to conduct an approach. At 0552 hours the flight was cleared to

descent. Fifteen minutes before touch-down ATC provided additional weather information which was: ceiling partially obscured, visibility zero in fog and smoke and the air calm. Six minutes later ATC advised the flight they were 22 miles from touch-down and that the runway 08 RVR indicated less that 1000 feet, with lights on strength 5.

A straight-in approach to runway 08 was made using the Instrument Landing System (ILS), with the approach being monitored by Precision Approach Radar (PAR). The approach was normal and 39 seconds prior to ground contact PAR advised the aircraft was on glide path and 100 feet left of the runway centre-line.

The aircraft landed hard, slightly right of the centre-line, 3436 feet from the threshold on a heading 8 degrees to the right of the runway, continued across the infield and taxi-ways and struck a group of light aircraft that were parked. The right wing then struck the airport ramp office and the aircraft skidded across the ramp in front of the terminal building, coming to rest with the nose of the aircraft buried about 18 feet inside a concrete block building.

A damaged ramp vehicle was on fire under the right wing. The First officer cut off the fuel supply when the aircraft came to rest, but No 2 engine on the left side continued to run for about 15 minutes due to damaged controls. The engine was torching due to incomplete internal combustion, with an efflux of flame from the tail pipe. The Aircraft emergency lighting system failed, but these fires provided illumination inside the aircraft and in the ramp area.

All passengers were located in the rear in the rear cabin. The rear galley door was opened by a stewardess and with the assistance of 2 stewards, the escape slide was deployed. However, the slide could not be inflated due to a malfunction. Although the cabin attendants attempted to restrain passengers, one jumped from the door and was seriously injured. The over-wing exits were opened by passengers and used for evacuation.

The purser was seated on the left side of the forward first class compartment and a stewardess was seated on the right side. During the ground roll the purser was observed to stand and move towards the aisle. The stewardess was releasing her seat belt when the aircraft struck the building and she did not see the purser again. After an unsuccessful attempt to open the forward cabin door, she evacuated through the hole in the fuselage on the left side.

DISCUSSION OF EVIDENCE

Approach to the minimum altitude of 400 feet above ground was normal. At this point the crew indicated that the approach and runway lights could still be observed. The Captain advised the First Officer (who was fling the aircraft) to maintain 400 feet for a “minute”. The PAR controller saw the radar target go slightly above the glide path at this point; it was observed to regain the glide path. He stated that the target was observed on the radar scope to cross the threshold of the runway on the centre-line on

the glide path. He further reported that it leveled of at a very low altitude and remained at this height until it disappeared from the radar scope. The glide scope crosses the threshold at about 36 feet above the runway. Assuming an average speed of 145 kt from the runway threshold to touch-down, it would take about 14 seconds to fly the 3436 feet. The engine spool down sound was heard on the cockpit voice recorder 13 seconds prior to contact. The flight data recorder indicated a rapid decrease in speed from this point. It can be concluded the aircraft flared below 36 feet.

After 10 seconds prior to touch-down the First Officer asked the Captain to turn on the main landing lights. Four seconds later the aircraft began to turn to the right. At 3 seconds prior to ground contact the Captain exclaimed that he did not know where they were. About 6 seconds after the accident a weather observation showed zero visibility at ground level. At roof level, which was about 30 feet above ground, the visibility to the north was ½ mile and the visibility to the southeast and southwest was 1/8 mile.

At 0445 hours when reported visibility conditions were similar an ILS approach was made by a DC8 and an overshoot initiated at about 250 feet as the Captain considered he would not have sufficient visibility for the flare and ground roll. The Captain of the DC8 reported he could see all the airport lights while on the downward leg of his circuit.

The weather information provided to the crew prior to and during the flight should have made them aware of the conditions to be expected at Vancouver. About 15 minutes prior to the accident Vancouver ATC informed the flight that the reported visibility was zero. About 6 minutes later the flight was advised that the RVR for runway 08 was less than 1000 feet. Both transmissions were acknowledged; however during the last transmission the First Officer requested that the undercarriage be lowered. The noise on the cockpit voice recorder indicates that the information concerning the RVR may not have been heard. From the time Flight 322 departed Honolulu until arrival the reported visibility at Vancouver varied between zero and 5/8 mile.

The crew and passengers indicated lights on the ground were clearly visible during the early stages of the approach. This would be expected as the shallow fog layer would not necessarily seriously reduce vertical visibility. During the approach to land the slant range visibility would reduce rapidly to near zero.

At 33 minutes prior to the accident CPAL dispatch advised the flight that stars at Vancouver had been clearly visible all night and that the visibility was improving. They also suggested that Flight 322 might have a “look” at Vancouver and if unable to land proceed to Abbotsford. The Captain and First Officer were aware that their landing weather minima at Vancouver were ceiling 400 feet and visibility 1 mile.

The Captain had been flying since 1940 and it would be expected that during his accumulation of nearly 13,000 flying hours he would have encountered fog conditions which could cause a sudden decrease in slant range visibility. When questioned in this regard the Captain indicated he had not experienced this phenomenon prior to the accident flight. Regulations in the United States prohibit approaches with reported visibility below the minimum required for landing. The Captain may not have been exposed to these conditions at United States airports.

The First Officer had limited pilot flying experience. Although he was flying the aircraft between Honolulu and Vancouver, he suggested to the Captain that he would operate the radio if the Captain would make the approach. The Captain indicated the First Officer should do the landing. The First Officer reported he had experienced decreasing slant range visibility in fog while flying as a Flight Engineer. He further indicated that initially he saw the airport beacon clearly and assumed the fog was patchy.

With the First Officer flying the aircraft during the approach it would be normal for the Captain to assume the First Officer's duties. As outlined in the Standard Airways' 707-138B Operations Manual this would include advice on altitudes prior to and on reaching the minimum. This was not done in this instance. Although the crew were advised 15 minutes prior to the accident that the visibility at Vancouver was zero, adequate preparations were not made, in the event visual reference was lost during the final stage of the approach. About 1 second before ground contact the First Officer suggested that a go-round should be made. He applied power immediately immediately after contact, which was retarded by the Captain. There was recorded evidence of dissension and a conflict of control input between the Captain and First Officer for a period of about 18 seconds following touch-down. The Captain indicated he took control of the aircraft's control wheel after the first ground contact. Sounds on the cockpit voice recorder indicate that engine power was applied and retarded on three occasions. Although the Captain did not consider a go-round could be safely made, he did not extend the speed brakes nor use reverse thrust to decelerate the aircraft. He reported that due to the motion of the aircraft after touch-down it was not possible to establish directional control which he considered necessary before employing these methods of slowing the aircraft.

The Captain and First Officer reported the speed during the approach was about 5 kt higher than the landing reference speed (Vref) of 140 kt. The Vref speed is derived from a formula reproduced in the Company's Aircraft Operations Manual and is set on the airspeed instrument by means of an adjustable indicator. However, the Vref speed used is about 5 kt higher than the speed on which the manufacturer had based the aircraft performance calculations. Landing performance charts in the Company manual are based on the lower Vref speed. Therefore, during the approach the aircraft was flown at a speed about 10 kt higher than the approach speed recommended by the manufacturer. The flight data recorder airspeed information indicates an additional 10 kt increase in indicated airspeed about the time the aircraft would have been over the end of the runway. The relatively high speed at the time of the flare for landing resulted in the aircraft floating above the runway for an excess of 3000 feet.

The crew met at the Seattle Airport on the day before the accident at about 1300 hours with the intention of boarding a flight to Vancouver. However, as this flight was cancelled, the Captain drove his own car to Vancouver. On arrival at Vancouver, flight planning for the flight to Honolulu started immediately. Including the drive from Seattle, the crew was on duty about 17 hours when the accident occurred. They had been without sleep for about 21 hours. The drive by the Captain between Seattle and Vancouver would likely to contribute to fatigue.

Studies of the effects of fatigue in flying have arrived at conclusions which include the following:

- The timing of motor responses suffers as fatigue develops.
- Fatigue produces a willingness to accept lower standards of accuracy and performance.
- A tendency to shift from instrument flying to more automatic reactions.
- An increase in forgetfulness in monitoring instruments out of the immediate range of vision.
- A tendency toward a sudden increase in errors near the end of a flight.

CONCLUSIONS

1. The aircraft was properly certified and was airworthy at the time of the first ground contact during the landing at Vancouver.

2. The airport and associated facilities were serviceable.

3. The flight crew were properly licensed, competent and physically fit to undertake the flight. However, considering the extended period on duty and without sleep, it is probable that a degree of fatigue was element in this accident.

4. The captain did not appreciate the hazard indicated by the meteorological information.

5. The flight crew were not prepared for the eventuality of a go-round.

6. The aircraft was flown at a higher than optimum approach speed.

7. The Captain permitted an inexperienced First Officer to attempt a landing under a reported visibility condition below the approved minimum.

8. The Captain failed to initiate a go-round procedure when visual orientation was lost prior to ground contact.

9. Following the loss of visual reference, there was confusion between the pilots as to actually had control of the aircraft.

PROBABLE CAUSE

Failure to evaluate known terminal weather information and to discontinue the attempt to land.


Canadian Pacific


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707B
Photo: Henry Tenby Collection