

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: August 27, 1951

Released: August 30, 1951

NORTHWEST AIRLINES, INC., MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT, MINNEAPOLIS, MINNESOTA, MARCH 18, 1951**THE ACCIDENT**

At approximately 1107,¹ March 18, 1951, a Douglas DC-4 aircraft, N-95426, owned by Northwest Airlines, Inc., and operating as Flight 108, landed in deep snow adjacent to Runway 29-L at the Minneapolis-St. Paul International Airport, Minneapolis, Minnesota. There were no injuries to the 13 passengers and 1 infant or to the 4 crew members aboard. The aircraft was substantially damaged.

HISTORY OF THE FLIGHT

Flight 108 departed Portland, Oregon, on March 17, 1951, for Minneapolis, Minnesota, with scheduled stops planned which included Billings, Montana, and Fargo, North Dakota. A routine crew change was made at Billings. The new crew consisted of Captain T. Franklin, First Officer A. Keller, and Stewardesses M. Keenan and M. Drury.

Flight 108 was off the ground at Fargo at 0950, March 18, on an instrument flight plan, to cruise at 5,000 feet to Minneapolis. The terminal weather forecast for Minneapolis available to the crew at the time of departure indicated a precipitation ceiling of 1,000 feet and visibility of three-quarters of a mile, ceiling variable from 500 to 1,500 feet and visibility variable from one-half to one and one-half miles. The total weight of the aircraft at departure from Fargo was 54,025 pounds, which was within the allowable gross limit of 65,000 pounds, and all disposable load was so distributed that the aircraft's center of gravity was within certificated limits.

At 1021 the flight reported over Alexandria, Minnesota, and estimated over Hamel.²

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

²Hamel is a standard airways fan marker on the northwest course of the MSP radio range 24 miles from the range station.

at 1053. At 1022 it received clearance from Air Route Traffic Control to cross Hamel at 3,500 feet, to maintain 3,500 feet, that no delay was expected, and to contact Minneapolis approach control when over Hamel. At 1036 the flight advised beginning descent from 5,000 feet and was given the 1030 Minneapolis weather: "Precipitation ceiling 1,600 feet, sky obscured, visibility one mile, variable with light snow, and blowing snow," with the remark that the visibility was "variable between three-quarters and one and one-quarter miles." This message was acknowledged by the flight. At 1051 Flight 108 reported over Hamel and advised that it was changing to Minneapolis Approach Control frequency. This facility was contacted, and acknowledged the position report. The 1030 Minneapolis weather was transmitted, followed by a clearance to the outer marker to maintain 3,500 feet. The flight acknowledged this clearance after which the captain was advised by Approach Control to change to company frequency, to give them a call, and then change back to approach control frequency. Thereupon the company was called and at 1055 the flight received the message that, "Reports indicate the approach lights on Runway 29-left are hard to see. Might be covered with snow." This was acknowledged by the flight. At 1058 Flight 108 was instructed by Approach Control to descend to 2,500 feet and to advise when leaving 3,500 feet. Descent was begun immediately and upon arriving at 2,500 feet Approach Control cleared the flight for an ILS (Instrument Landing System) approach and advised it to report when over the outer marker inbound, also that Runway 29-left was the runway in use and that the wind was northwest variable to north at 15 miles per hour. The following remarks were added by Approach Control to the clearance: "Northwest

108, Minneapolis Approach Control, a report on the runway, Runway 29-left, there is about eight to ten inches of fresh snow on the first third of the runway from the south-east end as far as the north-south runway, then from the north-south runway northwest, the runway is in good condition. The runway has been plowed from the north-south runway, northwest "

At 1104 Flight 108 was asked if it had completed the procedure turn inbound. The reply was that the flight was over the outer marker inbound and it was instructed as follows: "108 at the outer marker inbound, cleared to land and the wind is indicating north-northwest at 15 to 20, expect cross-wind from the right and there is 8-10 inches of snow on the first third of the runway." The flight reported having the field in sight at 1105, and at 1106 the control tower sighted the aircraft approximately over the end of the runway in a shallow right bank. It was then levelled off and placed in a shallow left bank, again levelled off and almost immediately made contact with the surface of the deep snow to the right of Runway 29-left. It continued ahead for a short distance until the nose gear collapsed causing other damage.

The accident occurred at 1107, and the local weather observation at 1100 indicated ceiling, precipitation 1,500 feet, sky obscured, visibility one mile variable, light snow, blowing snow, wind north-northwest at 15 mph, altimeter 2971, visibility variable 3/4 to 1 1/4 miles.

INVESTIGATION

Investigation revealed that the aircraft touched down approximately 600 feet northwest of the southeast end of Runway 29-left and approximately 96 feet to the right of the runway. Snow at this point was from four to five feet deep, in drifts. Wheel marks indicated that the nose wheel touched down approximately 18 feet before the main wheels. The aircraft plowed through the snow in a nearly straight line for a distance of about 274 feet. Approximately 93 feet from the initial touchdown of the nose wheel, the nose gear collapsed and folded rearward. It was severed from the aircraft structure, and was found in the snow about 86 feet beyond the point where it collapsed. Ninety-five feet from this point the aircraft came

to rest in a nose-down tail-high attitude on an approximate heading of 293 degrees magnetic. These measurements place it at a point 874 feet northwest of the threshold and 96 feet to the right of the runway.

There was no visible damage to the main landing gear. Nos 2 and 3 (the inboard) propellers were damaged and the radio loop antenna was broken off. The nose cap assembly was damaged beyond repair. The nose wheel well doors, several bottom structural frames and stringers, as well as some areas of the aircraft's skin, were damaged, requiring replacement.

Inspection of the pilot's control compartment indicated that all the aircraft's controls, including engine, fuel, electrical and radio, were in their respective correct positions, the flap control lever was down and the flap-position indicator showed that the flaps were down 45 degrees.

Runway 29-left at the Minneapolis-St Paul International Airport is concrete, 6,500 feet long, 200 feet wide, and is approved by the CAA for ILS straight-in approaches. The southeast half of this runway on the day the accident occurred was covered with eight to ten inches of fresh snow. This fact made recognition of the approach end of the runway extremely difficult. The northwest or far end of this runway had been plowed and the runway lights in this area were clearly visible to aircraft on the ground in that vicinity. However, under the poor visibility conditions, this snow clearance would be no help to aircraft attempting to land on the opposite, or unplowed end. The Bartow runway lights marking the right and left sides of the runway are placed 200 feet apart longitudinally, and are 27 feet from each edge of the runway. These lights are approved by the CAA and testimony indicated that they were illuminated at their highest intensity, 180,000 candle power, at the time of the accident. However, Captain Franklin stated that he saw no lights burning at any time during the approach and landing.

Due to the heavy snow condition at the time of the accident, these runway lights were marked by small red streamers, 18 inches by 2 inches, mounted on two-foot staffs attached to each runway light. The taxi strip adjacent to and paralleling Runway 29-left also has Bartow lights on both right and left sides as well as on its end. Due to heavier

snow along this taxi way, larger obstruction marker flags, 18 inches by 24 inches, were used to mark these lights. The purpose of these flags is to indicate the locations of these lights to avoid damage by snow removal equipment.

Runway 29-left is also provided with an approach lighting system which is a component of the ILS installation. These approach lights begin at a point 200 feet southeast from the threshold of the runway and extend for a distance of 3,050 feet toward the southeast. This approach lighting installation consists of 29 bars or rows of lights placed about 100 feet apart longitudinally. Each of these bars is 14 feet wide upon which five lights are mounted. These lights are clear in color and are of a maximum candle power of 90,000 each. This row of approach lights is located 117 feet to the left of the center line of Runway 29-left extended. The lights are beamed toward the approaching aircraft commensurate with the angle of the glide path and are approximately at the elevation of the runway. Lower personnel testified that they were operating at their highest intensity.

A Notice to Airmen (NOTAM) announcing the date of the commissioning of the ILS serving Runway 29-left as March 6, 1951, was published by the Civil Aeronautics Administration on March 5, 1951. This notice contained an error in stating that the center line of the approach light lane was 177 feet south of the runway center line extended. This NOTAM was posted on the pilots' bulletin board in NWA operations office and was read by Captain Franklin prior to departure of Flight 108. He added that he was aware that this must have been a discrepancy and that he was in no way confused by it, that the error in the publication did not influence him.

A second NOTAM dated March 6, 1951, was published announcing the actual commissioning of the facility and stated properly that the light lane was 117 feet south of the runway center line extended. This notice was not posted on the pilots' bulletin board. On March 22, 1951, a NOTAM was published correcting the typographical error made on the March 5, 1951, issue and this was posted on the NWA pilots' bulletin board.

The last aircraft to land on Runway 29-left previous to the accident was NWA Flight 500 which landed approximately an hour and a

half before. This flight advised the company that the runway lights were hard to see, adding that they might be covered with snow. This pilot report was relayed to Flight 108 during its approach. Snowfall had been continuous since about midnight of March 17, together with blowing snow, which caused variable visibility conditions and this continued throughout the day.

Captain Franklin had been flying from the Minneapolis-St. Paul International Airport for several years and was thoroughly familiar with the field and the usual winter difficulties caused by snow conditions. During this approach he stated that the ground was visible from 3,000 feet and that at 2,100 feet, shortly before arrival over the middle marker, he became contact and had the field in sight. Also, he stated that he had no trouble recognizing the airport area or the surrounding terrain with which he was familiar. Shortly after becoming contact and at a low altitude, the approach-light structure was seen to be slightly to the aircraft's right. Shallow right and left turns were made to align with the runway, at which time several flag markers were seen and almost immediately additional markers were observed to the right of these. The observed flag markers outlined the north edge of the runway and the south edge of the taxi-strip, respectively.

Captain Franklin had never made an instrument approach to Runway 29-left however, he had made several visual approaches to this runway which had been commissioned for ILS approaches only twelve days prior to the accident. The airport was described as a sea of snow, unbroken and without contrasting features or lines of delineation which would have indicated the relative position of the runway on the airport as a whole.

The captain stated that the ILS localizer and glide-slope transmitters were operating normally as well as the receivers and other electronic equipment in the aircraft.

ANALYSIS

Flight 108 became contact at 2,100 feet MSL (Mean Sea Level) shortly before arrival over the middle marker. The pilot stated he had the airport and the approach light structure in sight at this point but could not distinguish the runway from the whole airport area due to the snow condition.

He elected to abandon the ILS approach and to continue the descent visually as the aircraft was properly aligned with the runway at this time.

Due to the varying visibility caused by blowing snow, it may be reasonably assumed that the pilot momentarily lost sight of landmarks, such as the approach light structure which he was using for guidance, and thereby lost the alignment he had previously established. This could explain aircraft's later position to the left (or wrong side) of the approach-light structure. Also, the coincidence of seeing the widely spaced flag markers, after the corrective turns were made, may have been sufficient to assure the pilot that his directional corrections had placed him in line with the runway. Under the reduced visibility conditions this false indication of the location of the runway can be understood.

On the other hand, Captain Franklin had been warned that the approach end of the runway had not been plowed and that the runway and runway lights were difficult to see.

Since this information had come from a pilot of one of the company's aircraft which had landed an hour and a half previous, and since snow had continued to fall during the intervening time, it should have been obvious that these conditions had worsened. In addition, Captain Franklin said that the visibility decreased as the aircraft neared the boundary of the airport.

In view of the foregoing adverse conditions and the fact that the aircraft was not properly aligned with the runway at its

extremely low altitude, the captain showed poor judgment in not executing a missed approach procedure.

FINDINGS

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

1 The company, the aircraft, and the crew were properly certificated

2 There was no malfunctioning of the aircraft or any of its components prior to the accident

3. The flight started an ILS straight-in approach to Runway 29-left and in the vicinity of the middle marker abandoned the instrument approach and continued VFR to the landing

4. The runway and runway lights were partially obscured by snow

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the failure of the pilot to identify properly and align the aircraft with the assigned runway due to snow coverage and poor visibility.

BY THE CIVIL AERONAUTICS BOARD

/s/ DONALD W. NYROP

/s/ JOSH LEE

/s/ CHAN GURNEY

Oswald Ryan, Vice Chairman, and Joseph P. Adams, Member of the Board, did not participate in the adoption of this report.

Supplemental Data

INVESTIGATION AND HEARING

The Civil Aeronautics Board was notified of the accident involving Northwest Airlines, Inc., at Minneapolis, Minnesota, by CAA Communications, Minneapolis, Minnesota, at 1300C, March 18, 1951. An investigator from the Board's Chicago office proceeded to the scene of the accident and 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 Minneapolis on April 4, 1951.

AIR CARRIER

Northwest Airlines, Inc., is incorporated in the State of Minnesota and maintains its principal place of business at Minneapolis, Minnesota. Northwest Airlines, Inc., possesses a certificate of public convenience and necessity and an air carrier operating certificate which authorizes the carriage of persons, property and mail, over the route described in this report.

FLIGHT PERSONNEL

Captain Toy W. Franklin, age 41, held a valid airline transport pilot rating. He had a total of 15,086 flying hours. His last instrument check was accomplished on September 19, 1950, and his last CAA physical examination was December 15, 1950. First Officer Archie C. Keller, age 32, held a valid airman certificate with a commercial pilot and multi-engine instrument rating. He had a total of 3,597 flying hours. His last CAA physical examination was accomplished August 16, 1950. The other crew members were the stewardesses, Marilyn Ann Drury and Margaret Keenan.

THE AIRCRAFT

N-95426, a Douglas DC-4, manufactured on November 15, 1943, had a total of 20,115 flying hours and was currently certificated by the Civil Aeronautics Administration. It was equipped with four Pratt & Whitney engines, 2SD13G and the propellers were Hamilton Standard Hydromatic, full feathering type