

FOR IMMEDIATE USE

DEPARTMENT OF COMMERCE
Washington

April 28, 1937

Secretary Roper today made public the report of the Accident Board of the Bureau of Air Commerce in connection with the air line accident near Milford, Pennsylvania, on December 19, 1936. The report is as follows:

REPORT OF THE ACCIDENT BOARD

Statement of probable cause concerning an accident which occurred to an aircraft of North American Aviation, Inc. near Milford, Pennsylvania, on December 19, 1936

To the Secretary of Commerce:

On December 19, 1936, at approximately 8:47 P. M. at a point about four miles northeast of Milford, Pennsylvania, an airplane of United States registry, while being flown in scheduled interstate operation carrying mail, passengers and express, met with an accident which resulted in serious injuries to the pilot, minor injuries to the co-pilot and one passenger and the complete destruction of the aircraft.

The pilot, Henry T. Merrill, held a Federal transport pilot's license and a scheduled air transport rating. His latest physical examination, taken on October 15, 1936, showed him to be in good physical condition and his license and rating were renewed on that date. The co-pilot, John A. Battle, held a Federal transport pilot's license and a scheduled air transport rating. His latest physical examination, taken on November 2, 1936, showed him to be in good physical condition.

Those on board were:

Pilot Henry T. Merrill
New York, New York

Hubert A. Hall
Harrington Park, N. J.

Co-Pilot John A. Battle
Hasbrouck Heights, N. J.

E. Sperber
West Palm Beach, Fla.

Steward Jay Sisson
Newark, New Jersey

A. F. Blomquist
New York, New York

V. Lebow
Baltimore, Maryland

Sam Saggio
Milburn, New Jersey

R. V. Lake
Woodmere, L. I., N. Y.

W. T. S. Critchfield
Surrit, New Jersey

Sam S. Alexander
Pt. Lorth, Texas

The aircraft, a Douglas, model DC-2, was inspected and approved for relicense by the Department of Commerce on October 2, 1936, and bore Federal license number NC-13732. It was owned by North American Aviation, Incorporated, and, at the time of the accident, was being operated by the Eastern Airlines Division on their Trip No. 14, scheduled from Miami, Florida, to Newark, New Jersey, with one stop, at Charleston, South Carolina. This operation was permitted under Federal Letter of Authority dated November 7, 1935.

At Charleston, the regular schedule was modified due to weather ahead and the acceptance of a passenger and cargo for Washington, D. C. The flight, scheduled to leave Charleston at 4:40 P. M. and to arrive at Newark at 8:40 P. M. was cleared from Charleston at 5:25 P. M. for Camden instead of Newark. Newark and Boston were named as alternates and a stop was authorized at Baltimore, Maryland, weather permitting, for the purpose of discharging the Washington passenger and cargo. It was known at the time that weather would not permit a stop at Washington. The Company weather forecast, indicated low ceilings from Charleston to the vicinity of Washington and ceilings of 300 to 1000 feet from Washington to Newark. Fresh to strong southeast to east winds backing south to southwest above 5000 feet were predicted. Instrument flying was expected and the pilot authorized to proceed by their use.

Nothing unusual was reported concerning that portion of the flight between Charleston and Washington. Washington was definitely identified at 7:39 P. M. by passing over the cone of silence at that station. Baltimore was identified by the glow of lights in the overcast but no attempt was made to land due to weather. Between these two points the pilot navigated by use of the northeast leg of the Department of Commerce Radio Range Station at Washington. In the vicinity of Baltimore, heavy rain squalls were encountered accompanied by so much static that both the regular and auxiliary radio range receivers on the airplane became useless. At the same time exceptionally rough air was encountered which was prevalent throughout the remainder of the flight. Icing conditions were also encountered but did not prove hazardous. The airplane's two-way radio for communication with ground stations, operating on a higher frequency than the range receivers, did remain operative throughout the flight. However, this was of no assistance to the pilot in holding a course.

After losing the radio range signals, due to rain static, the pilot continued on toward Camden, flying at an altitude of 5000 feet and holding the same compass heading of 60° as between Washington and Baltimore. He expected no difficulty in keeping reasonably on course and believed that as he approached Camden he would be able to tune in on the Department of Commerce radio range at that point. He radioed Newark that he would be over Camden (at 8:24 P. M.) 45 minutes after passing Washington.

When approximately 30 minutes out of Washington (8:09 P. M.), the pilot received radio instructions from Newark to land at Camden and discharge the Washington passenger and cargo. Four minutes later the pilot radioed Newark that one engine was rough and that he would proceed directly to Newark, preferring the better weather conditions which existed at that point. Then about 42 minutes out of Washington (approximately 8:21 P. M.) and thinking that he was in the immediate vicinity of Camden, the pilot changed his course to due east to offset the easterly wind at lower altitude and began

to descend. Still being unable to identify Camden by radio range or otherwise, he radioed Newark at 8:25 P. M. stating that he was unable to determine whether or not he had passed over Camden and requesting the weather and clearance to land at Newark. He was advised that the ceiling at Newark was 1000 feet with 5 miles visibility, that no other airplanes were between him and the airport and was given clearance to land. Having flown the easterly course for approximately six minutes and descended to an altitude of 2500 to 3000 feet, the pilot again resumed the 60° course with Newark as the destination, still believing that he was reasonably on course.

Having been unable to tune in the Newark or any other radio range, the pilot continued to descend slowly in an effort to see something on the ground by which to check his course. At an altitude of approximately 2000 ft. lights on the ground became visible for a few moments which the pilot believed to be at either Trenton or Princeton and which confirmed his belief that he was on course and approaching Newark. He continued to descend slowly expecting to break through the ceiling in the vicinity of New Brunswick or Rahway and continue to the airport below the ceiling which, from the radio clearance of a few minutes before, he expected to be at 1000 feet.

Then at an indicated altitude of between 1400 and 1500 feet above sea level and still descending slowly, the left wing of the airplane struck a tree. From this point on the pilot used just enough engine power to keep the airplane in a landing attitude while passing through about 400 feet of small trees. The airplane finally came to rest on the side of and almost on top of a small hill. The elevation at which the airplane came to rest was 1140 feet, indicating a considerable lag in his altimeter.

In reviewing the weather in connection with this accident, the Company trip forecast was as follows:

"Overcast with light rains - ceilings locally zero to 500 feet Charleston to vicinity of Washington and 300 to 1000 feet Washington to Newark. Fresh to strong (19 to 33 miles per hour) southeast to east winds backing south to southwest above 5000 feet."

The winds aloft prediction in this trip forecast could not be checked by balloon soundings of the upper air due to rain and low overcast over the entire area of the flight. Sounding were made at Washington and Newark at approximately 5:00 A. M. on the morning of the 19th. However, this was more than 12 hours prior to clearing the flight.

The United States Weather Bureau forecast available in the Airways Communication Office at Charleston before the departure of the airplane contained the following information:

"Continued low overcast with light to occasionally moderate rain and light to moderate fog for Virginia, North Carolina and central and western South Carolina, with ceilings mostly 100 to 500 feet."

Terminal forecasts for Washington, Baltimore, Camden and Newark predicted continued overcast with variable rain occasionally heavy and occasional fog with ceilings low to very low (1000 - 100 feet) occasionally approaching zero and visibility mostly low (3/4 mile) to 4 miles, occasionally approaching very low (1/5 mile).

At the same time the United States Weather Bureau forecast covering the eastern seaboard, which was available at the Weather Bureau office at Newark and Washington airports and, therefore, available to the company dispatching personnel at these points, predicted the following:

"Newark-Boston, Boston-Bangor, Boston-Montreal, Boston-Albany, Albany-Montreal, Albany-Buffalo, Newark-Albany, Newark-Buffalo, Newark-Washington - Northeast wind moving low from Georgia and Tennessee will cause spreading precipitation extending throughout area by end of period except northern half Maine beginning as snow and changing to sleet and then rain. Overcast all sections with lowering ceilings. Ceiling generally low to 1500 feet except over 3000 beginning period through northern New York and northern New England and continuing over 3000 northern Maine. Ceiling occasionally very low to zero through rough terrain and coastal sections south of Maine. Visibility generally better than 2 miles but occasionally very low to zero over rough terrain and coastal sections south of Maine. Ice conditions occasionally severe north of New Jersey especially in interval of snow changing to rain."

The terminal forecasts for Washington, Baltimore, Camden and Newark were identical with those quoted above. The terminal forecasts for Hartford and Boston were:

"Overcast with rain beginning early in period and continuing except probably starting as sleet. Ceiling 1300 to 2500 beginning period lowering rapidly to low and continuing variable low to 1200 and later becoming occasionally very low. Visibility low to four miles, probably severe ice conditions early in period."

The Department of Commerce has specified certain minimum weather conditions which must obtain before any airplane engaged in scheduled passenger carrying operations may be dispatched from one point to another. These conditions in part are as follows:

1. The observed weather information issued by the United States Weather Bureau must indicate that the ceiling and visibility at the point to which the flight is being cleared are and will definitely remain equal to or above the minimums authorized by the Secretary of Commerce for landing down through until the flight arrives at such point.
2. One alternate landing field must be designated in the clearance which must conform to the following:
 - a. It must be close enough to be reached at normal cruising speed with a 45-minute reserve supply of fuel still in the airplane.
 - b. The official weather information must indicate that the ceiling will remain at 1500 feet or better and that the visibility will remain two miles or better during the estimated flight time required to reach the alternate.

As concerns this operation the authorized minimums at Camden, the point to which the flight was dispatched out of Charleston, are ceiling 500 feet and visibility two miles. The official weather forecast ceilings varying through the period of the flight from low to very low (1000 - 100 feet) occasionally approaching zero. For Newark, named as an alternate landing field, the weather forecast was the same as for Camden. For Boston, the see

named alternate, the weather forecast indicated that the ceiling would not remain above the 1500-foot minimum altitude for an alternate.

In reviewing the weather relating to this flight, it should be noticed that actually it remained better than the Weather Bureau forecast indicated. The ceiling and visibility at Camden did remain at or above the minimum of 500 feet and two miles, respectively, and this terminal did remain open sufficiently for a landing had the pilot been able to reach there. The ceiling at Newark lowered steadily to less than the 1500 foot minimum necessary for an alternate field but did remain open within the restriction of a dispatch terminal and several flights from the west and from the north were successfully terminated at this point in the interval of shortly before and shortly after this flight was due. In all cases these other pilots were fortunately able to maintain radio range reception. From Charleston to Washington the flight involved in the accident flew at an altitude of 5000 ft. where it was aided in its progress by the strong south-southwest winds which were reported to exist above 5000 feet. Flying an average compass course of 30° over this portion of the flight, they would not and did not cause any appreciable drift. They would, however, cause an appreciable drift when the flight changed to a compass course of 60° at Washington.

The fact that the flight encountered rain squalls and extremely rough air at Baltimore was an indication of a definite change in the wind direction and very likely velocity. It appears that the level above which the strong southwesterly wind existed and below which the strong south-southeasterly winds existed was somewhat higher from Baltimore on than it had been south of Baltimore, although it may still have been near the 5000 foot level. Thus the pilot had a strong crosswind from the right which drifted him considerably to the north. Actually, with the course as flown, a south-southeast wind of fifty miles per hour would account for the location of the accident. The location of the accident and the time interval indicate that the flight first got off course almost immediately after passing Baltimore and that the lights on the ground, mistaken by the pilot for Trenton or Princeton, were most likely Allentown or Bethlehem, Pennsylvania.

From a study of available facts, several things become evident. In the dispatching of this flight out of Charleston, the weather information issued by the United States Weather Bureau did not indicate that the ceiling and visibility at Camden, the point to which the flight was cleared, would remain throughout the period of the flight equal to or above the minimums authorized. Likewise, there was no indication that the ceiling and visibility at Newark and Boston, the alternates named, would remain equal to or above the minimums authorized. The pilot, after having flown into the static area, would be expected to continue on his course until he was reasonably sure that he could not again pick up the Camden radio range signals. On the actual path which the pilot flew, however, he was probably never nearer to the Camden radio range than forty miles nor nearer than fifty miles to the Newark radio range and it would not require exceptionally heavy rain static to render these stations unusable over these and greater distances. The pilot must have flown within three to five miles of the Martin's Creek radio range but this would have been after the two changes in course which took place in the vicinity of what was believed to be Camden or Trenton, and appears that both pilot and co-pilot had given up hope of obtaining usable radio reception at that time and so did not tune in Martin's Creek during the period when they were so close to the station that it must have given usable signals through the static.

When this flight had proceeded to the point where the pilots had given up hope of obtaining usable radio range reception, it was too late to return to the area where they could obtain radio range guidance and retract their flight, due to the fact that the nearest field on the return route at which weather conditions were safe for effecting a landing, was out of range of the remaining fuel supply. These circumstances, however, did not preclude continuing the flight at a safe altitude above the terrain in the general area until every possible means for determining position had been exhausted. The two-way radio functioned throughout the flight and by its use the pilot could have learned of the better weather to the north and that other flights had successfully reached Newark by aid of the Bellefonte, Martin's Creek and Newark ranges. The evidence indicates that there was sufficient fuel in the airplane for two or more hours of flying.

Having received information that a ceiling of 1000 feet with five miles visibility existed at Newark and believing that he was satisfactorily on course as a result of years of experience in flying this route in bad weather the pilot felt confident that he would have no trouble continuing the flight by dead reckoning to a point near enough to Newark to let down safely through the clouds into the 1000 foot ceiling area. However, failure to identify Camden, his first objective after entering the static area, should have caused him concern and he displayed overconfidence in the dead reckoning course which he was flying by failing to use all of the means at his command in an effort to establish a definite position relative to his intended course and was in error for attempting to let down under the overcast for a landing at Newark without having established his position.

It is the opinion of the Accident Board that the probable causes of this accident were:

Error on the part of the pilot for attempting to get down under the overcast without first definitely proving his position.

Improper dispatching for clearing the flight into an area of predicted bad weather, particularly when the area cleared therein did not permit a safe return, and

Static conditions encountered which rendered reception of the radio range signals over the airplane's range receivers unintelligible.