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NATIONAL
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AIRCRAFT ACCIDENT REPORT

Cessna 182, N70586
Duluth International Airport
Duluth, Minnesota
November 8, 1972

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NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20591
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Cessna 182, N70586
Duluth International Airport
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November 8, 1972

Adopted: April 26, 1973

NATIONAL TRANSPORTATION SAFETY BOARD
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16. Abstract At approximately 1029 c.s.t. on November 8, 1972, Cessna 182, N70586, a general aviation business flight, crashed approximately 2-1/2 miles northwest of Duluth International Airport, Duluth, Minnesota, while attempting a precision radar approach to Runway 9. The approach was being made in instrument conditions. The aircraft was destroyed by impact forces and postimpact fire. Two passengers were killed. The pilot, the only other occupant of the aircraft, was seriously injured. The National Transportation Safety Board determines that the probable cause of this accident was the action of the pilot in continuing operation in known icing conditions without aircraft deicing or anti-icing equipment, which resulted in a loss of control because of ice accretion on airframe surfaces.					
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S P E C I A L N O T I C E

This report contains the essential items of information relevant to the probable cause and safety message to be derived from this accident/incident. However, for those having a need for more detailed information, the original factual report of the accident/incident is on file in the Washington office of the National Transportation Safety Board. Upon request, the report will be reproduced commercially at an average cost of 15¢ per page for printed matter and 85¢ per page for photographs, plus postage. (Minimum charge is \$2.00.)

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591
AIRCRAFT ACCIDENT REPORT

Adopted: April 26, 1973

CESSNA 182, N70586
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA
NOVEMBER 8, 1972

SYNOPSIS

At approximately 1029 central standard time, November 8, 1972, a general aviation business flight, Cessna 182, N70586, crashed while executing a precision radar approach to Runway 9 at the Duluth International Airport, Duluth, Minnesota. The aircraft was destroyed by impact forces and postimpact fire. Two passengers were killed. The pilot, the only other occupant of the aircraft, was seriously injured.

The National Transportation Safety Board determines that the probable cause of this accident was the action of the pilot in continuing operation in known icing conditions without aircraft deicing or anti-icing equipment, which resulted in a loss of control because of ice accretion on airframe surfaces.

INVESTIGATION

At approximately 0713 1/ on November 8, 1972, the pilot of N70586 contacted the Minneapolis Flight Service Station by telephone and received a briefing on the weather conditions between Minneapolis and Duluth, Minnesota. Included in the briefing was the Duluth terminal forecast for low ceilings and visibilities.

In addition, the applicable aviation area forecast specified low ceilings and poor visibilities en route with light to occasional, moderate, mixed icing in clouds and in precipitation above the freezing level. The area forecast indicated that the freezing level over Minnesota would be from the surface to 4,000 feet.

After he received the weather briefing, the pilot filed an instrument flight rules flight plan from St. Paul to Duluth, Minnesota. At 0855, the pilot and two passengers departed from the St. Paul Downtown Airport in a Cessna 182, N70586. The purpose of the flight was to transport two employees of the University of Minnesota to Duluth to attend a business meeting.

After the takeoff, the flight proceeded at an assigned altitude of 5,000 feet under the control of the Minneapolis Air Route Traffic Control Center. Near the Duluth area, the flight was assigned and cleared to an altitude of 6,000 feet.

About 0935, the pilot requested the Duluth weather. Duluth Approach Control advised that the weather was: "measured ceiling 300, visibility two with fog, runway nine visual range more than 6,000."

Approximately 10 minutes before this exchange of weather information, a pilot flying a Piper Aztec aircraft, N137MH, reported to the Duluth Tower controller and stated that he had missed the approach and was returning to Minneapolis. The same pilot had previously advised the controller that he was picking up light rime ice, and, at the time of the missed approach, he stated that he was picking up heavy ice.

Although this information was recorded on the tower tape the controller stated that he had no recollection of receiving any report of heavy ice; and therefore none of the information concerning the weather reported by the Aztec pilot was passed on to N70586. Traffic controllers are required to relay pilot reports of significant weather such as moderate to severe icing conditions, but in this instance the information was apparently neither heard nor relayed.

1/ All times used herein are central standard, based on the 24-hour clock.

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At 0954, the pilot of N70586 reported over the Duluth VOR ^{2/}, and, after holding briefly west of the Pike Lake Outer Compass Locator, was cleared for an Instrument Landing System (ILS) approach to Runway 9 at 1005. About the same time, an Air Force pilot flying a T-33 jet aircraft was landing on Runway 9. This pilot reported to the tower controller, "the ceiling's about one indefinite - ah - two hundred maybe a hundred and fifty." This information was not given to N70586.

Subsequently, N70586 made an ILS approach to Runway 9, and at approximately 1012, the pilot advised Duluth Tower that he was executing a missed approach. The pilot further reported that he was having trouble with his gyrocompass and requested a PAR ^{3/} approach. This request was coordinated with the military PAR controller who had monitored the initial ILS approach, and he agreed to provide the service. It was decided a "No gyro" ^{4/} procedure would be used. Duluth Approach Control cleared N70586 to climb to 3,000 feet and to return to the Pike Lake Outer Compass Locator for another approach. About 1021, during a procedure turn, the pilot advised, ". . . I was just picking up-ah-some ice, if I miss it this time I'll have to-ah-climb out." The controller acknowledged with missed approach instructions to be followed if the approach could not be completed.

During the investigation, the PAR controller stated that:

"The aircraft intercepted the final approach at a very high angle. He was below the glide slope and was so advised many times. At approximately two miles from touchdown he stated he was picking up ice and started a rapid left turn. I instructed him to turn right, and asked if he wanted to continue the approach. He said 'Yes'. His left turn continued and I stressed the fact that he should be in a right turn He was also slightly below glidepath, falling further below, and was so advised."

The pilot stated that the ice continued to build during the approach, and he experienced increasing difficulty holding altitude as he continued to add power. He was unable to maintain altitude, even with full power, at the time of the crash.

The pilot of N70586 received instructions to execute a missed approach at approximately 1028, and he replied, "Five eight six". That was the last known recorded transmission from the aircraft. Shortly thereafter, the PAR controller last observed the aircraft target going in a northerly direction, approximately 1-1/2 miles west of the runway touchdown point.

^{2/} Very High Frequency Omnidirectional Radio Range.

^{3/} Precision Approach Radar. Commonly known as Ground Controlled Approach (GCA).

^{4/} Pilot is not required to fly headings but instead is instructed by the controller when to start and stop turns.

The aircraft was found in a wooded area approximately 2-1/4 miles from the threshold of Runway 9, and 1-1/8 miles to the left of the localizer centerline. The time of the accident was established as 1029.

An examination of the wreckage revealed that all aircraft components were found along a path extending 75 feet from the point of initial impact on a bearing of 014°. The angular measurement from the swath cut through the tops of the trees to the final impact (nose gear) point was approximately 30°. There were no known ground witnesses to the accident. The aircraft was destroyed by impact forces and postimpact fire.

The two passengers were fatally injured. The pilot was seriously injured.

Examination and inspection of the aircraft's wreckage disclosed that: (1) There was no separation of structural components prior to impact. (2) Most of the fuselage, including the cockpit area, and the inboard portion of the wings had been subjected to an intense ground fire. (3) The propeller blades showed evidence of considerable torsional twisting. An 8-inch piece of one of the propeller blades had separated and was found in the main wreckage area. This piece of blade showed evidence of chordwise nicks, gouges, and scoring along the leading edge. (4) The gyrocompass was recovered from the wreckage and examined; however, its exposure to intense ground fire precluded obtaining any meaningful information. (5) The vacuum pump was recovered and examined. Although the shaft could be rotated by hand, the pump showed evidence of having been exposed to intense heat. (6) A heated Pitot tube and a windshield defroster were the only deicing or anti-icing equipment installed on the aircraft. (7) The aircraft instrument panel contained a magnetic compass, turn and bank indicator, and an attitude indicator in addition to other instruments normally found in small aircraft equipped for instrument flight.

Official surface weather observations for Duluth were, in part, as follows for the times indicated:

1013 - Special, partly obscured, measured 300 feet overcast, visibility 3/4-mile, fog, wind 080°, 9 knots, altimeter setting 30.18 inches, Runway 9 visual range 6,000 feet plus, 8/10 of the sky hidden by fog.

1018 - Special, partly obscured, measured 200 feet overcast, visibility 1 mile, fog, wind 110°, 10 knots, altimeter 30.18 inches, Runway 9 visual range 6,000 feet plus, 4/10 of the sky hidden by fog.

1035 - Special, measured 200 feet overcast, visibility 2 miles, fog, wind 110°, 11 knots, altimeter 30.18 inches.

The temperature at Duluth was subfreezing before and after the accident.

A flight check of the navigational facilities at Duluth International Airport was commenced approximately 4-1/2 hours after the accident. The preliminary portion of the flight check was concluded with the completion of two ILS approaches and one PAR approach. However, due to excessive ice accumulation on the check aircraft, all portions of the required flight check were not completed until November 13, 1972. The overall navigational facility performance and procedures were considered satisfactory.

Duluth International is a jointly operated military/civilian airport.

The pilot held a commercial pilot certificate with airplane single-engine land and instrument ratings. (See Appendix A for additional information.)

ANALYSIS AND FINDINGS

There was no failure or malfunction of the airframe or powerplant before impact with the trees. The aircraft was certificated in accordance with the applicable regulations and was equipped with both a glide slope and a localizer for making ILS approaches. The pilot was certificated and qualified in accordance with the applicable regulations.

After departing from St. Paul and reaching cruising altitude, the flight contacted Duluth Approach Control at 0935, and was given the latest Duluth weather. The Safety Board considers that this would have been an appropriate opportunity to provide the pilot with significant weather information, including the report of icing conditions from another pilot who had just missed his approach and returned to Minneapolis. Knowledge of that icing report while he was still at cruising altitude, in ice-free conditions, could have had some influence on the pilot's decision to descend and attempt the approach under the existing conditions. The same rationale could apply to the ceiling and visibility information that was reported by the T-33 pilot. This report was given at about the time the pilot of N70586 began his approach, and contained information that the ceiling was lower than previously reported to N70586. It is also noted that by the time the pilot initiated his second approach, the officially reported ceiling had lowered to 200 feet, but this information was not provided to the pilot of N70856.

However, in considering the influence this additional weather information might have had on the pilot's decisionmaking process, the Safety Board notes the overriding evidence of the pilot's determination to land at Duluth. He was aware that en route icing conditions had been forecast before his departure from St. Paul, and any doubt about the actual weather conditions at Duluth should have been dispelled during the first approach. Despite the airframe ice and marginal weather conditions, he decided to attempt a second approach.

In considering the final portion of the PAR approach, it is evident that the pilot encountered increasing difficulty in maintaining altitude as the PAR controller continued to report the aircraft below the glide-path. Eventually, the ice accretion so affected the airframe surfaces that the aircraft could no longer remain airborne even with full power. The pilot then lost control of his aircraft as it descended to treetop level and crashed.

In regard to the possibility of a malfunctioning gyrocompass, the Safety Board is of the opinion that N70586 was equipped with sufficient instruments for an instrument-rated pilot to conduct a safe flight without a gyrocompass.

An analysis of the weather conditions at Duluth at the time of the accident indicates that conditions were conducive to moderate to severe airframe icing in the clouds and conducive to carburetor icing below approximately 4,000 feet m.s.l. Further analysis indicates that the weather at Duluth was slightly worse than forecast and that the weather briefing provided to the pilot by Minneapolis Flight Service Station was adequate.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the action of the pilot in continuing operation in known icing conditions without aircraft deicing or anti-icing equipment, which resulted in a loss of control because of ice accretion on airframe surfaces.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

April 26, 1973

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CREW INFORMATION

Pilot Thomas M. Vogt, aged 40, is an attorney who held commercial pilot certificate No. 1948842 with airplane single-engine land and instrument ratings. His second-class medical certificate was issued October 20, 1972, with the limitation that corrective lenses must be worn while exercising the privileges of his pilot certificate.

Pilot Vogt, as of the day of the accident, had accumulated approximately 727 flying hours, all of which were in the Cessna 182. He had **flown** 65 hours in the preceding 90 days. He had approximately 30 hours of actual instrument time and approximately 80 hours of simulated instrument time.

AIRCRAFT INFORMATION

N70586, a Cessna 182M, S/N 182-59313, was certificated on November 1, 1968, and had been flown a total of 769 hours since it was new. The last annual inspection was completed on November 8, 1971, at which time the aircraft had been flown 582 hours. The aircraft was powered by a Continental 0-470-R engine, S/N 194700-8-R.

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