

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: January 10, 1975

Forwarded to:

Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-74-119 thru 125

On October 28, 1973, a Piedmont Airlines Boeing 737-222, overran the departure end of runway 14 on the Greensboro-High Point-Winston-Salem Regional Airport, in Greensboro, North Carolina. Five persons were injured, and the aircraft was damaged substantially.

The flight had completed an ILS approach and landed with a tailwind on a rain-flooded runway. The approach was conducted at night and under instrument meteorological conditions.

The National Transportation Safety Board's investigation indicates that intense rain, poor visibility, a tailwind, and flight profile discrepancies were factors in the accident. Dynamic hydroplaning of the aircraft's tires on the flooded runway and the adverse wind resulted in a loss of braking reaction and directional control.

The Safety Board's statistical data on air carrier landing accidents show that from 1962 through 1972, 12 hydroplaning accidents were reported. Although the fatality rate for hydroplaning accidents was low, the damages to aircraft were more than \$10 million. By comparison, two recent jet aircraft hydroplaning accidents resulted in \$6.5 million in damages.

Twenty-five percent of the hydroplaning accidents involved downwind landings, 16 percent involved crosswind conditions, and 50 percent involved pilot-judgment factors.

Honorable Alexander P. Butterfield (2)

In the past, the variables that caused hydroplaning could not be observed practically, nor could the effect of hydroplaning be applied to aircraft performance to determine accurately aircraft stopping capability. Therefore, on July 10, 1973, following the Northwest Airlines, Inc., Boeing 747 overrun accident at Miami, Florida, the Safety Board recommended that the FAA expedite its research program to determine friction characteristics on wet runways, not only for its effect on landing certification requirements for aircraft, but also for the certification of runway surfaces under the new Airport Certification Regulations. The FAA responded that computer studies were being made to determine if correlation of friction measurements between ground vehicles and aircraft was possible.

Following the accident in Greensboro, NASA personnel indicated to the Board that there was sufficient knowledge about runway surface texture measurements, runway drainage characteristics, and runway slipperiness testing to predict runway braking coefficient accurately. The Safety Board believes that current runway readings of friction coefficient should be used for air carrier dispatch purposes and to advise pilots as to whether dynamic hydroplaning is probable.


Accordingly, the National Transportation Safety Board recommends that the Federal Aviation Administration:

1. Amend appropriate regulations and procedures to establish an alerting service to advise pilots of hydroplaning probabilities before and during the landing approach. Such an advisory system would entail (1) a runway slipperiness rating and runway contamination monitoring program; and (2) the use of measuring devices and associated charts to correlate rainfall rate, wind direction, and velocity, with runway gradient and water depth on the runway surface.
2. Establish operating limitations for crosswind and tailwind components when hydroplaning conditions are probable and incorporate these limitations in the FAA Approved Airplane Flight Manuals for all transport category airplanes.
3. Amend 14 CFR 91, 14 CFR 121, and 14 CFR 135 to include provisions (similar to Sections 91.209, 121.629, and 135.85 which govern operation in icing conditions) that would prohibit the pilot from landing an aircraft when, in his judgment, hydroplaning conditions would impair the safety of flight.

Honorable Alexander P. Butterfield (3)

4. Amend 14 CFR 61.153 to require that an applicant for an airline transport pilot certificate be knowledgeable of hydroplaning phenomena.
5. Amend 14 CFR 121.419 to require ground training for hydroplaning phenomena and associated operating techniques to be used when hydroplaning conditions are encountered unexpectedly.
6. Amend 14 CFR 135.138 to require adequate testing with respect to knowledge of the hydroplaning phenomena and associated operating techniques to be used when hydroplaning conditions are encountered unexpectedly.
7. Amend 14 CFR 121.135 and 14 CFR 25.1585 to require flight manuals to contain information on the hydroplaning phenomena and recommended techniques to be used in hydroplaning encounters.

REED, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.

By: 
John H. Reed
Chairman