

required braking distance of 8,694 feet, if engine reverse thrust is not used. Obviously, the aircraft could not have been stopped on the runway under these conditions, unless the aircraft had landed within the first 656 feet of the runway or had used engine reverse thrust. However, the No. 4 engine was shut down, the No. 3 engine reverser malfunctioned, and problems with directional control of the aircraft hindered the crew from using a sufficient amount of reverse thrust in the Nos. 1 and 2 engines.

The correlation between the flight recorder data, the touchdown point, and the scrub marks found on the runway indicates dynamic hydroplaning by the aircraft for approximately 3,000 feet during initial ground roll. The scrub marks on the runway also show that viscous hydroplaning in varying degrees occurred until the aircraft reached a point approximately 1,400 feet from the end of the overrun, where some effective braking did occur.

Except for the malfunction of the No. 3 engine reverser and the failure of the Nos. 1 and 9 tires, no other malfunction or failure was found that could have adversely affected the stopping distance of the aircraft.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the ineffective braking capability of the aircraft on the wet runway because of the low coefficient of friction of the new runway surface, and insufficient engine reverse thrust to decelerate the aircraft. The combined effects of the lack of the No. 4 engine reverse thrust and malfunction of the No. 3 engine reverser resulted in a directional control problem and restricted the use of Nos. 1 and 2 engine reversers.

RECOMMENDATIONS

In view of the potential hazard involved in overrun accidents, the Board recommends that:

The Federal Aviation Administration expedite its research program to determine the friction characteristics of wet runways, not only for its effect on the landing certification requirements for aircraft, but also for the certification of runway surfaces under the new Airport Certification Regulations.
(Recommendation No. A-73-49.)

As a result of the test conducted for the Board by NASA and the FAA, the Dade County Port Authority decided to groove Runway 9L/27R and Runway 9R/27L. The Airport Authority petitioned the FAA for financial assistance and received a grant for matching funds under the Airport Development Aid Program. The 44-day grooving operation commenced on April 10, 1973.