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**NATIONAL TRANSPORTATION SAFETY BOARD
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**OPERATIONAL FACTORS GROUP CHAIRMAN'S FACTUAL REPORT
ATTACHMENT 32: AA LANDING UNDER ADVERSE WEATHER
GUIDANCE**

**American Airlines flight 1420
Little Rock, Arkansas
June 1, 1999**

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Attachment 32

to Operational Factors Group Chairman's Factual Report

DCA99MA060

AA Landing Under Adverse Weather Conditions Guidance

Landing Under Adverse Weather Conditions

General

This section discusses those techniques that apply to varying degrees of adverse landing conditions, from the everyday crosswind landing to the more complex problems of tire hydroplaning and slippery runways.

Don't try to offset a poor runway braking condition by landing short. While it is important not to land long, landing short can have more serious consequences than overrunning the far end of the runway at low speed. The desired touch-down point is still about 1000 feet from the approach end of the runway.

Brakes

The braking force available from the tires is proportional to the area in contact with the runway, the force on the tires perpendicular to the runway, the brake coefficient, and friction between the tires and runway. The contact area normally changes little during the braking cycle. The coefficient of friction depends on the tire condition and runway surface (concrete, asphalt, dry, wet or icy). The perpendicular force comes from airplane weight and any downward aerodynamic force. Raising the speedbrakes spoils the lift of the wing at this high speed and places approximately 70% of the airplane weight on the wheels. This increases the effectiveness of the brakes, when required, during the high speed portion of the landing roll.

Apply enough forward pressure on the control column to ensure effective nosewheel steering. However, avoid applying too much forward pressure as this creates a lifting force on the tail which takes some weight off the main gear, reducing braking effectiveness by as much as 10%.

Manual Brake Stopping

The following recommended procedure for using manual braking will give the optimum braking for all runway conditions:

- For short or slippery runways, immediately after nose gear touchdown, use full brake pedal.
- For long runways, soon after nose gear touchdown, smoothly apply a constant brake pedal pressure for the desired braking.
- DO NOT - DO NOT attempt to modulate, pump or improve the braking by any other special techniques.
- Do not release the brake pedal pressure until the airplane speed has been reduced to a safe taxi speed.
- To reduce brake wear, on runways where stopping distance is not a factor, delay applying brakes until the airplane has slowed below 100 knots. Then, smoothly apply a constant brake pedal pressure for the desired braking.

