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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

OPERATIONAL FACTORS GROUP CHAIRMAN'S FACTUAL REPORT
ATTACHMENT 36: AA WET/SLIPPERY RUNWAY – CROSSWIND GUIDANCE

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

DCA99MA060

Attachment 36

to Operational Factors Group Chairman's Factual Report

DCA99MA060

AA Wet/Slippery Runway – Crosswind Guidance

Slippery Runway - No Crosswind

Braking on a slippery runway can range from good to virtually nil. Snow-covered runways are at least twice as slippery as a dry runway. Ice-covered runways can be four to 16 times as slippery as dry runways, depending upon temperature. Ice near the melting point is the most slippery.

Standing water and slush on the runway can produce hydroplaning as well as low-speed slickness. Hydroplaning speed will frequently be less than the touchdown speed. The higher the speed, the greater the hydroplaning effect. Without reverse, hydroplaning can double or triple runway stopping distance.

At high speeds on slippery runways, reversing is the best aid in stopping. Using high levels of *symmetrical* reverse early in the landing roll will produce the greatest degree of stopping force. When coming out of reverse, do not rapidly go to forward idle thrust. This may aggravate the stopping problem. Directional control will be primarily through use of the rudder. At lower speeds, nosewheel steering and differential braking may provide directional control.

Slippery Runway - Crosswind

A slippery runway and crosswind make a bad combination. Plan touchdown on the center line or slightly on the upwind side.

After touchdown, the airplane may weathervane into the wind and drift toward the downwind side of the runway. At high speeds, use rudder pedals for steering while holding steering wheel centered, since nosewheel is easily overcontrolled with steering wheel.

One of the worst situations occurs when there is a crosswind and sufficient water and speed to produce total tire hydroplaning. Reverse thrust tends to disrupt airflow across the rudder and increases the tendency of the airplane to drift downwind, especially if a crab or yaw is present.

As reverse thrust increases above 1.3 EPR, rudder effectiveness decreases until it provides no control at about 1.6 EPR. Do not exceed 1.3 EPR reverse thrust on the *slippery portions of the runway*, except in an emergency.

If weathervaning or moving to the downwind side of the runway, release brakes and reduce or stop reversing to regain control. Forward thrust can push airplane onto the desired runway track even with little or no traction. Use of forward thrust must be tempered by runway remaining. Do not come out of reverse at a high RPM. Sudden transition of reversers before engines spool down will cause a forward acceleration. Tires will regain traction as airplane slows below hydroplaning speed, thus improving directional control.

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