

LOG # 279

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: August 3, 1981

Forwarded to:
Honorable Raymond A. Barnhart
Administrator
Federal Highway Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

H-81-37 through H-81-39

About 7:25 a.m., central standard time, on November 16, 1980, an intercity-type bus was traveling south on U.S. Route 183, a two-lane rural highway in south-central Texas. It was raining and the pavement was wet. As the bus approached and attempted to negotiate a curve to the left, the rear tires of the bus lost traction. The bus skidded across the opposing traffic lane and onto the shoulder before it could be steered back onto the highway. As it crossed the highway again, the bus spun 180° and slid into a drainage ditch where it struck the side of the ditch and overturned onto its left side. Two bus passengers were killed, and the busdriver and 35 passengers were injured. 1/

The bus was owned by a church in Austin, Texas, and was registered as a private bus. Therefore, it was subject only to State of Texas motor vehicle regulations. The bus front tires had adequate continuous tread groove depth while all four bus rear tires were worn to or below the top of the fillets at some part of the tire or across the entire tire. As a result, the tread groove patterns were no longer continuous and a "slotted" tread pattern developed. This slotted tread pattern developed before the tires were worn to the tread wear indicators, which were designed below the fillets.

U. S. Route 183 was a two-lane, two-way asphalt concrete highway. The accident occurred at a shallow 2° curve to the left and in a rural area that had a posted speed limit of 55 mph. The pavement at the accident site was deteriorated at the time of the accident, with lateral cracks visible about every 10 to 15 feet and several patches. Contour and rutting bar measurements of the pavement surface revealed a number of points where water could accumulate or drainage would be slow.

1/ For more detailed information, read: "Highway Accident Report: East Side Church of Christ Bus Skid and Overturn, U.S. Route 183, Near Luling, Texas, November 16, 1980" (NTSB-HAR-81-4).

After the accident, the Texas Department of Highways and Public Transportation (DOT) performed sand patch tests and locked-wheel skid trailer tests at the accident site. The sand patch tests indicated that the pavement surface texture depth in the traffic lanes was considerably reduced, when compared to tests made on similar new pavement surfaces, and texture depth was predominantly below those acceptable or minimum levels that have been recommended by research. High speed trailer tests indicated that tire-to-pavement frictional quality for passenger car-type tires was significantly degraded at wet pavement speeds near the posted speed limit. High speed tests on a machine that simulated the wet pavement surface at the accident site indicated an even greater loss of tire-to-pavement frictional quality when the bus tires were tested. Bus tire-to-pavement frictional values were obtained during wet pavement braking tests that were equivalent to attempting to stop or slow a vehicle on ice, even when a bus front tire with more than adequate tread depth was tested.

Wet pavement cornering tests indicated that the worn bus rear tires had a much lower capability to resist sliding sideways during a turn than the front tires. The pavement and tire tests and the physical evidence found at the accident scene indicated that it was possible for the bus rear tires to have lost traction while the busdriver was simply attempting to negotiate the curve at or near the posted speed limit. The Safety Board has concluded that the low wet cornering capability of the marginal yet "legal" bus rear tires and the low frictional quality of the wet pavement combined to cause the accident. Physical evidence and test data also indicated that any small reduction in traveling speed or improvement in tire or pavement condition may have prevented this accident.

The Safety Board examined current State of Texas and Federal programs, policies, and standards to determine their effectiveness in reducing wet weather accidents of this type. Such measures could assist by (1) reducing high speed operation in wet weather, (2) providing adequate performance standards for the design of tires, (3) prohibiting the use of marginal or inadequate tires, (4) providing objective methods to detect pavement with low wet frictional quality, (5) providing objective methods to more consistently warn the public of pavement segments with low wet frictional quality, and (6) providing objective methods to determine when pavements with low wet frictional quality should be repaired. However, the Safety Board found that neither Texas nor Federal agencies have adopted standards able to assist in preventing this type of accident. The Safety Board was able to identify standards and policies used by the State of Pennsylvania regarding pavement evaluation that could theoretically assist in preventing this type of accident, but these standards need further evaluation.

"Slippery when wet" signs are used nationally to advise drivers to slow down or use caution on pavement with low wet frictional quality. Since no tests were made at the accident site before the accident and there was no significant accident history near the accident site, there was no reason for the Texas DOT to have been alerted to a potential wet weather problem before the accident and to have posted such signs. However, even though tests made after the accident indicated that the pavement surface was slippery when wet, no signs were posted by the Texas DOT, which has adopted the Federal Highway Administration's (FHWA) national guideline for the posting of these signs. This reinforced the Safety Board's belief that the national guideline, which only states that a sign should be posted "where the highway surface is extraordinarily slippery when wet," is too general to insure consistent use of these signs. The Pennsylvania Department of Transportation (Penn DOT) has a policy that would require posting these signs in reaction to the tests made, and its guideline seems theoretically practical and effective enough for the Safety Board to recommend further evaluation and consideration for national purposes.

The State of Texas vehicle inspection criteria contain pass/fail guidelines regarding tire cuts, tire tread depth, and tread wear indicators. The bus had passed Texas inspection about 11 months before the accident and had to be inspected again within 2 weeks after the accident to remain in service. If the bus had been inspected on the day of the accident, there is some question as to whether the rear outer tires of the bus would have passed Texas inspection guidelines for cuts. However, because of limits in Federal and Texas regulations, the bus rear tires probably would have passed Texas guidelines for tread groove depths, even though they were worn below continuous tire tread groove depths and less than 2/32 inch of any tread pattern remained in areas of three of the four rear tires.

It was noted that the lack of appropriate inspection guidelines is not confined to Texas. Although not applicable to the bus involved in this accident, Federal Motor Carrier Safety Regulations for inspecting vehicles that operate interstate do not contain appropriate guidelines for rejecting tires worn to the fillets and below continuous tire tread groove depths. The Bureau of Motor Carrier Safety (BMCS) has responsibility for developing and enforcing Federal Motor Carrier Safety Regulations for commercial vehicles operating interstate. The Safety Board believes that the BMCS should examine all recommended and existing inspection guidelines for commercial vehicle tires and insure that appropriate guidelines are established for the rejection of tires before they are worn to noncontinuous tread groove depths. Commercial vehicle owners and operators should also be alerted regarding these guidelines to insure an understanding of the need for compliance with them.

The Texas DOT has no written guidelines or standards regarding the detection of potential wet pavement problem locations or pavement corrective actions that should be taken in relation to locked-wheel trailer test results, sand patch tests, accident rates or any other measure of wet pavement performance. Since the Texas DOT had no guidelines or standards in this area, the Safety Board used guidelines developed by the Federal Highway Administration (FHWA) and other States to evaluate the ability to detect and correct potential pavement problems at the accident site. Again, since there were no tests made at the accident site and there was no significant accident history before the accident, there was no reason for the Texas DOT to have been alerted to a potential wet weather problem before the accident. However, the Safety Board concluded that under FHWA guidelines the tests made after the accident would have identified the pavement at the accident site as a potential wet pavement accident problem in need of analysis for corrective action.

As to policies for corrective repair of the pavement surface that are based on locked-wheel trailer results, the FHWA has no specific policy and there is no national policy from other national associations or agencies. In 1971, the Safety Board recommended that the FHWA establish a policy in this area, especially a minimum skid number or range of skid numbers whereby the pavement surface would be corrected on a high priority basis, simply because of its accident potential. That type of policy, in combination with an appropriate tire policy, should eliminate tire-to-pavement frictional quality that is equivalent to attempting to slow or stop a vehicle equipped with adequate tread depth tires on ice, a condition that existed in this accident. In 1976, the Safety Board recommended that the NHTSA establish minimum frictional quality standards for commercial vehicle tires so that tire frictional quality can be maintained at some minimum level and not compromise minimum pavement standards. The NHTSA concurred with the recommendation; however, to date, no rulemaking action has been taken by the NHTSA.

In keeping with a needed minimum skid number policy that would eliminate hazardous stopping conditions, the Safety Board believes that the pavement at the accident site should be updated on a high priority basis. The deteriorated condition of the pavement and increasing traffic demand provide further support for updating on a high priority basis. In the absence of a national minimum skid number policy, the Safety Board examined other State policies to determine if they could at least serve to alleviate the problems this accident illustrated.

The Penn DOT has a pavement correction policy that would require corrective work to be completed "as soon as fiscally possible" for pavements with trailer test results below 0.30 and no significant accident history, the circumstances at this location. Only locations that have both low frictional quality and a high accident history would have a higher priority. Such a policy is consistent with the Safety Board's recommended minimum skid number policy, and the Safety Board recommends that the Pennsylvania policy be further evaluated and considered for national application by the FHWA.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the Federal Highway Administration:

Revise Sections 393.75(b) and (c) of the Federal Motor Carrier Safety Regulations to prohibit the use of tires worn to noncontinuous tread groove depths on any axle of a commercial interstate vehicle. (Class II, Priority Action) (H-81-37)

Issue an On-Guard Bulletin to advise owners, operators, maintenance personnel, and State commercial vehicle inspectors of the problems associated with operating vehicles equipped with tires worn to noncontinuous tread groove depths. (Class II, Priority Action) (H-81-38)

Evaluate Pennsylvania Department of Transportation policies for the placement of "slippery when wet" signs and the detection and correction of potential wet pavement problem locations for national policy purposes. (Class II, Priority Action) (H-81-39)

DRIVER, Vice Chairman, and McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations. KING, Chairman, did not participate.


By: James B. King
Chairman