LOG H-277

# NATIONAL TRANSPORTATION SAFETY BOARD
## WASHINGTON, D.C.

ISSUED: August 3, 1981

Forwarded to:

Honorable William P. Clements, Jr.
Governor of Texas
Austin, Texas 78711

SAFETY RECOMMENDATION(S)

H-81-40 through -43

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 noncontinuous tread groove depths at some part of the tire or across the entire tire, and a "slotted" tread pattern developed. This slotted tread pattern developed before the tires were worn to the tread wear indicators.

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.

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

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).

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. When the signs are used, there is evidence that they are effective in reducing traveling speed, especially when used with flashing lights. 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 seemed 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 depth 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 should be noted that the lack of appropriate inspection guidelines is not confined to Texas. The Safety Board has found sufficient evidence to indicate that all Federal and State tire inspection criteria should be examined for their ability to reject tires worn to these levels.

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.

Although recommended by the Safety Board in 1971, there is still no specific national policy that would require the correction of pavement surfaces that produce hazardous stopping conditions for tires with more than adequate tread depth, the condition of the pavement at the accident site. The Safety Board believes that the pavement surface should be updated on a high priority basis to eliminate such conditions. Increasing traffic demand and the deteriorated condition of the pavement provide further support for updating on a high priority basis. According to a Penn DOT policy for correcting pavement surfaces, corrective repair would be completed as soon as fiscally possible; only locations that have both low frictional quality and a high accident history would have a higher priority. The Safety Board has recommended that the Pennsylvania policy be further evaluated as a candidate for national application.

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

-- the Texas Department of Public Safety:

> Revise its tire tread depth inspection criteria to prohibit the use of tires worn to noncontinuous tread groove depths. (Class II, Priority Action) (H-81-40)
>
> Re-evaluate its tire tread depth inspection criteria that limits the tread depth criteria to only one tire in each set of dual wheels while permitting that tire to have less than 2/32 inch of tread depth in the shoulder grooves at the same time. (Class II, Priority Action) (H-81-41)

--that the Texas Department of Highways and Public Transportation:

> Post "slippery when wet" signs with flashing lights at the accident location until the pavement surface is repaired and its skid resistance qualities are improved. (Class II, Priority Action) (H-81-42)

Repair and improve the skid resistance qualities of the pavement surface at the accident location after those locations with high accident histories and low frictional quality are improved. (Class II, Priority Action) (H-81-43)

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

By: James B. King
Chairman