

Log H-0434

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 27, 1984

Forwarded to:

Honorable Ray Barnhart
Administrator
Federal Highway Administration
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)
H-84-93

About 8:40 a.m., on July 5, 1984, a northbound automobile followed by a Terrell Trucking, Inc., tractor dump-type semitrailer (truck), traveling empty, was approaching the crest of a hill on U. S. Route 71, about 1 mile south of Ashdown, Arkansas. The automobile driver said that she was traveling between 40 and 45 mph when she glanced into her rearview mirror and saw the trailing truck so close behind her that she could see the front of the truck but not the driver inside; she then looked forward and saw a flashing light on an approaching police car in the southbound lane as it crossed the hillcrest ahead. She said that she then saw three more cars with flashing lights behind the lead car and "touched" her brake pedal to slow. The truck following the automobile also braked and then jackknifed. The tractor rotated counterclockwise; the front end of the tractor crossed the highway centerline and struck the third car in the southbound caravan, a DeQueen, Arkansas Police Department patrol car occupied by four police officers. The right front of the tractor near the end of the tractor bumper struck the left front of the patrol car. The portion of the tractor ahead of the front axle overrode the patrol car's passenger space, instantly killing the four police officers inside. 1/

The truckdriver said that he was about three car lengths--about 60 feet--behind the automobile he was following just before the accident. When the automobile driver applied brakes in response to the approaching police cars with the flashing lights, the truckdriver had no alternative to making a sudden brake application to try to avoid striking the automobile. The truckdriver probably could not have turned right to avoid the braking automobile because it would have taken the truck 100 feet or more to turn 6.5 feet to clear the rear of the automobile. With a 60-foot headway, the truck was 40 feet too close to avoid impact.

A severe brake application on a wet pavement often results in a jackknife. The Truckdriver's Handbook published by the American Trucking Associations, Inc., states:

1/ For more detailed information, read Highway Accident Report--"Collision of DeQueen, Arkansas, Police Department Patrol Car and Terrell Trucking, Inc., Tractor-Semitrailer, U.S. Route 71, Ashdown, Arkansas, July 5, 1984" (NTSB/HAR-84/07).

Tailgating

1. Never follow another vehicle so closely that you annoy or bother its driver, or so close that you will not be able to make a safe stop under any conditions. Observe a 2-second following distance at speeds up to 40 mph. 2/ At higher speeds, your safe following time should be doubled to 4 seconds. Under adverse conditions such as rain, fog, or snow, increase your following distance still more to insure being able to avoid an accident. 3/

Based on this guideline, the truckdriver should have allowed at least a 240-foot interval (about 12 car lengths) between his truck and the automobile ahead since the truck was traveling about 40 mph (59 feet per second) and the pavement was wet.

The lateral stability of an articulated vehicle (such as a tractor-semitrailer) during braking operations is dependent on balanced braking on both units. Partial braking at single wheel positions or imbalanced braking from opposite wheels on the same axle can influence the lateral movement of one or both of the units in combination. The coefficient of friction on the roadway, the condition and proper operation of the service brake components, and the proper adjustment of the brake actuators at each wheel position are critical factors that affect vehicle stability when braking.

Jackknifing is primarily attributed to a relative change in the speed and/or direction of the tractor and semitrailer while both units are in motion. Effective semitrailer braking is absolutely essential in the avoidance of jackknife accidents. The semitrailer brakes exert a retarding force on the combination to maintain it in straight alignment and to prevent the semitrailer from overrunning the tractor and causing the tractor to rotate laterally about its fifth wheel attachment. Jackknifing can occur without vehicle braking; however, it usually occurs during moderate to heavy braking applications. Studies indicate that the probability of occurrence of a jackknife before an accident, compared to the probability of its nonoccurrence, are about 10 times greater on a wet road than on a dry road. 4/

In this accident, a brake imbalance existed between the tractor and semitrailer because of the improper brake adjustments. When the service brakes were applied during the sudden stop maneuver, it caused the tractor to decelerate more rapidly than the semitrailer. This circumstance caused the semitrailer to overrun the tractor, applying a force at the fifth wheel connection between the tractor and semitrailer, and the tractor rotated laterally. The rotation caused the front of the tractor to deviate left from its forward path. The continued forward movement of the semitrailer forced the front of the rotating tractor across the highway centerline, where it struck the patrol car, and then to fully jackknife to the left side of the semitrailer.

Current clamp-type chamber air brakes lose effectiveness with increasing brake chamber stroke. The brake adjustments on three of the six tractor wheels and on all four semitrailer wheels were close to the maximum stroke limit. The stroke adjustment on the two wheels of the front (steering) axle were beyond the maximum stroke recommended by

2/ Two-Second Rule- A defensive driving rule of thumb used to determine a safe following distance. If one car stays two seconds behind the car ahead, a safe distance will be insured under ideal conditions.

3/ Truckdriver's Handbook, American Trucking Associations, Inc., July 1980, p. 10.

4/ Fleischer, G. A., Philipson, L. I., "Statistical Analyses of Commercial Vehicle Accident Factors," Vol. 2 - Summary Report, Final Report, 1973.

the manufacturer; the excessive stroke resulted in a significant reduction in, or possibly the total elimination of, braking at those wheels. The four semitrailer brakes failed to stop the rolling wheels when the service brakes were applied during a road test after the accident. Also, a brake shoe that could not make drum contact at the right rear tandem axle wheel of the tractor caused imbalanced braking on the rear tandem axle of the tractor.

Therefore, the National Transportation Safety Board recommends that the Bureau of Motor Carrier Safety of the Federal Highway Administration:

Issue an "On-Guard" Bulletin which discusses the circumstances of the accident in Ashdown, Arkansas, on July 5, 1984, with particular reference to tailgating by trucks, improper adjustment of truck brakes, and the tendency of trucks to jackknife on wet pavement. (Class II, Priority Action) (H-84-93)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in this recommendation.

By: Jim Burnett
Chairman

Patricia A. Halaman
for