



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

---

**Date:** August 5, 1998

**In reply refer to:** H-98-19 through -23

Mr. Walter McCormick  
President and Chief Executive Officer  
American Trucking Associations  
2200 Mill Road  
Alexandria, Virginia 22314

Mr. Tom Sever  
Acting President  
International Brotherhood of Teamsters  
25 Louisiana Ave., N.W.  
Washington, D.C. 20001

Mr. Tim Lynch  
President and Chief Executive Officer  
Motor Freight Carrier Association  
499 South Capitol St., S.W.  
Suite 502A  
Washington, D.C. 20003

---

About 5:52 a.m. on February 12, 1997, a doubles truck with empty trailers, operated by Consolidated Freightways, Inc., (CF) that was traveling northbound on U.S. Route 41, a four-lane divided limited access highway, near Slinger, Wisconsin, lost control and crossed over the 50-foot depressed median into the southbound lanes. A flatbed truck loaded with lumber, operated by McFaul Transport, Inc., that was traveling southbound on U.S. Route 41 collided with the doubles truck, lost control, and crossed over the median into the northbound lanes. A northbound passenger van with nine adult occupants struck and underrode the right front side of the flatbed truck at the landing gear. A refrigerator truck loaded with produce, operated by Glandt/Dahlke, Inc., that was also traveling northbound, struck the right rear side of the flatbed truck. Although it had snowed from about 8 p.m. to 3 a.m. the night before, it was clear at the time of the accident. Other motorists and the emergency responders to the accident scene reported icy patches in the roadway. Eight of the nine van occupants suffered fatal injuries, and the remaining occupant suffered serious injuries. Two of the three commercial truckdrivers were treated for minor injuries and released; the third refused treatment.<sup>1</sup>

---

<sup>1</sup>For further information, read Highway Accident Report—*Multiple Vehicle Crossover Accident, Slinger, Wisconsin, February 12, 1997* (NTSB/HAR-98/01).

The National Transportation Safety Board determined that the probable cause of the accident was the doubles truckdriver's lack of judgment in driving too fast for the configuration of his truck under the hazardous highway weather conditions. Contributing to the severity of the injuries and the reduced potentiality for survival was the lack of restraint use by the unrestrained occupants of the passenger van.

One of the concerns raised by the accident was the sufficiency of the doubles truckdriver's training. The Safety Board examined the doubles driver's training and experience with regard to operating doubles. The doubles driver had participated in and successfully completed a 1-week course on operating doubles at the United Parcel Service in November 1995. The course specifically addressed the dynamics of doubles trailers and the operation of doubles in adverse weather, including snow and ice. At the conclusion of the training, the driver demonstrated proficiency in operating doubles and was certified to operate them. While CF does not have its own training program that specifically addresses doubles operations, the firm only hires drivers who have either graduated from an acceptable driving school or who have at least 1 year's experience with comparable equipment. The doubles driver met this CF requirement.

When hired by CF, the driver successfully passed a road test driving doubles and was certified by CF to operate them. Furthermore, the driver had been driving doubles virtually every day since he was hired by CF in October 1996 until the accident; thus, he would have operated doubles for about 4 months in all types of weather. He said that he had driven this particular route about once a week since October 1996 and was comfortable with operating doubles in this area. He had no accidents or incidents involving doubles trailers before the Slinger accident. Although this was the first time that the driver had driven two empty trailers on this route, he had previously driven empty doubles. Therefore, based on his training and experience, the Safety Board concluded that the doubles truckdriver had received training driving doubles equivalent to the degree of training provided under normal minimum industry practices.

Although the CF driver had received doubles training consistent with industry norms, the training did not ensure that the driver properly recognized and responded to the dangerous circumstances inherent in the combination of vehicle and highway conditions confronting him. While the Safety Board could not determine whether training using a simulator or a skid pad would have influenced the judgment of the CF driver, experience in other transportation modes suggests that simulator training can prepare operators to respond appropriately to hazardous conditions and thus help prevent accidents.

The Safety Board examined several recent truck accident studies in light of this accident. A 1996 analysis<sup>2</sup> of truck accidents carried out for the U.S. Department of Transportation Office of Motor Carriers by the University of Michigan Transportation Research Institute (UMTRI) indicates that most truck accidents occur on dry pavement. Another study,<sup>3</sup> conducted in Indiana, found that, compared to single-trailer vehicles, double-trailer vehicles with single-drive axles had

---

<sup>2</sup>*Truck and Bus Accident Factbook, 1994*, prepared by the Center for National Truck Statistics, UMTRI, for the Office of Motor Carriers, Federal Highway Administration, October 1996, UMTRII-96-40, p. 21.

<sup>3</sup>Braver, Elisa, R.; Zador, Paul, L.; Thum, Denise; Mitter, Eric, L.; Baum, Herbert, M.; and Vilardo, Frank, J.; "Tractor-Trailer Crashes in Indiana: A Case-Control Study of the Role of Truck Configuration," *Accident Analysis and Prevention*, Vol. 29, No. 1, 1997, pp. 79-96.

fewer crashes on dry and wet pavements (excluding snow, ice, and slush) and fewer crashes involving multiple vehicles. However, this study also showed that doubles were over-represented in crashes on road surfaces with ice, snow, or slush. (The Indiana study excluded accidents on ramps, which minimized the number of rollover accidents included in the study group.)

The over-representation of doubles in crashes involving roadway conditions of ice, snow, and slush is likely due to the special susceptibility of doubles to these environmental factors. Doubles, in general, are more reactive to wind (which is often present under such wintry conditions) than are single-trailer vehicles, because they have more points of articulation, making them more sensitive to sway. Doubles with single-drive axle tractors are also more susceptible to low-friction roadway surfaces, because they have fewer contact points with the road and less effective traction than single-trailer vehicles with dual-drive axle tractors. Therefore, the Safety Board concluded that the greater instability of double-trailer vehicles with single-drive axles renders them more vulnerable to accidents on ice, snow, and slush than single-trailer vehicles with dual-drive axles.

Research has shown that empty or lightly loaded doubles are more susceptible to wind than heavily loaded doubles. One study carried out at UMTRI<sup>4</sup> demonstrated the sensitivity of empty doubles and triples to crosswind-induced offtracking and rollover. This study simulated wind gusts of up to 25 mph. Phase 4 vehicle dynamics model simulations conducted for the Safety Board with regard to the Slinger accident show that, with crosswinds of 0 to 3 mph (and all other things being equal), the empty doubles truck would remain stable. However, when the crosswinds rise to 8 mph, the truck becomes only marginally stable. Therefore, based on these findings, the Safety Board concluded that lightly loaded or empty doubles trucks can be susceptible to even slight crosswinds.

The Slinger accident also raised issues concerning the possible safety benefits of traction control devices. Jackknife can result from the drive axle's loss of traction caused by locked, retarded, or spinning wheels. Although speed was a significant factor in the Slinger accident, the Safety Board sought to determine whether use of a traction control device or system could have sufficiently ameliorated the wheel spin on the drive axle of the doubles truck to have prevented its jackknife. The Board contracted with UMTRI staff to run Phase 4 vehicle dynamics model simulations with input parameters from the Slinger accident to simulate the effect that a traction control system might have had on it.

The Phase 4 model simulations indicated that, without traction control and under the conditions known about the accident, the doubles truck would have jackknifed at a speed of 58 mph. The known conditions include the prevailing wind and road friction. The wheel spin initiating the jackknife was caused by excess power for the available road friction. The inclusion of a traction control system in the Phase 4 simulations significantly increased the ability of the doubles truck to avoid jackknifing. Although the simulations showed that the tractor instability was not prevented by the traction control mechanism, its use generally diminished the rapidity of the loss of control. Therefore, the Safety Board concluded that, at the speed and under the

---

<sup>4</sup>MacAdam, Charles, C., "The Crosswind Sensitivity of Unladen Doubles and Triples Combinations and Their Susceptibility to Wind-Induced Offtracking and Rollovers," Supplement to *Vehicle System Dynamics*, Volume 20, August 1991, pp. 432-445.

conditions in which the accident took place, antilock brake and traction control technology would have given the doubles truckdriver more time to respond to the loss of stability.

The Safety Board considers that traction control devices help drivers maintain stability, particularly for single-drive axle vehicles operating with light loads on low-friction roadways. Truck brake manufacturers are currently marketing traction control devices as performance equipment and antilock brakes as safety equipment. Although traction control devices can be added to antilock brake systems at minimal cost, traction control devices are not required.

Finally, another issue raised by this accident was on-board event recorders. On-board recorders are used for accident investigation and reconstruction and, by the trucking industry, as management tools for carrying out speed control and incentive systems for drivers. Although the Slinger doubles truck had an electronic control module, it did not have optional on-board recording devices. Consequently, the truck's actual speed at the time of the collision was not readily available.

"Automatic information recording devices" is a safety issue on the Safety Board's "Most Wanted" list. The Safety Board considers that adequate on-board recording devices are necessary in all modes of transportation because information from them can be used to identify safety trends, develop corrective actions, and conduct more efficient accident investigations. Cockpit voice recorders and flight data recorders, or black boxes, have been on commercial airliners for years. Since 1993, event recorders have also been required on trains. Through Safety Recommendations R-96-46 and -47, the Safety Board recommended that the Federal Transit Administration and the American Public Transit Administration develop guidelines for event monitoring/recording devices for rapid transit cars and urge transit agencies to install such devices on new and rehabilitated cars. Regarding marine transportation, the Safety Board has recommended the use of voyage event recorders for marine accident reconstruction for more than 20 years.

The Safety Board has also made recommendations regarding recorders for highway trucking transport. Although the recommendation was primarily aimed at reducing fatigue-related accidents, in 1990,<sup>5</sup> the Safety Board issued Safety Recommendation H-90-28 to the Federal Highway Administration (FHWA):

H-90-28

Require automated/tamper-proof on-board recording devices, such as tachographs or computerized logs, to identify commercial truckdrivers who exceed hours-of-service regulations.

The Safety Board reiterated H-90-28 in its 1995 study on truckdriver fatigue,<sup>6</sup> explaining that the intent of the recommendation was to provide a tamper-proof mechanism that could be used to enforce the hours-of-service regulations, rather than relying on drivers' handwritten logs. In a February 1997 response, the FHWA acknowledged that on-board recording devices will

---

<sup>5</sup>Safety Study—*Fatigue, Alcohol, Other Drugs, and Medical Factors in Fatal-to-the-Driver Heavy Truck Crashes* (NTSB/SS-90/01).

<sup>6</sup>Safety Study—*Factors That Affect Fatigue in Heavy Truck Accidents* (NTSB/SS-95/01).

eventually be an important tool for monitoring the hours of service of commercial motor vehicle drivers. However, the FHWA stated that "the FHWA position is that the benefits and practicality of on-board recorders must be firmly established before rulemaking ensues." The current status of Safety Recommendation H-90-28 is "Open—Unacceptable Action."

Therefore, the National Transportation Safety Board makes the following safety recommendations to the American Trucking Associations, the International Brotherhood of Teamsters, and the Motor Freight Carrier Association:

Work, together with the Federal Highway Administration and the National Highway Traffic Safety Administration, to encourage the development and use of simulator-based training for heavy truck operators. (H-98-19)

Work, together with the National Highway Traffic Safety Administration and the Federal Highway Administration, to conduct laboratory and truck fleet testing to assess the safety benefits of adding traction control devices to antilock brake systems and report your findings to the National Transportation Safety Board. (H-98-20)

Work, together with the National Highway Traffic Safety Administration and the Federal Highway Administration, to encourage the trucking industry to gain experience with traction control devices through fleet tests. (H-98-21)

Notify the trucking industry of the circumstances of the multiple vehicle crossover accident that took place in Slinger, Wisconsin, on February 12, 1997, and develop motor carrier guidelines for the operation of empty or lightly loaded multiple-trailer vehicles during inclement weather conditions. (H-98-22)

Advise your members to equip their commercial vehicle fleets with automated and tamper-proof on-board recording devices, such as tachographs or computerized recorders, to identify information concerning both driver and vehicle operating characteristics. (H-98-23)

Also, the Safety Board issued Safety Recommendations H-98-8 through -13 to the Federal Highway Administration, H-98-14 through -17 to the National Highway Traffic Safety Administration, H-98-18 to the National Association of Governors' Highway Safety Representatives, H-98-24 to the American Association of State Highway and Transportation Officials, H-98-25 to the Wisconsin Department of Transportation, and H-98-26 to the Independent Truckers and Drivers Association, the National Private Truck Council, and the Owner-Operators Independent Drivers Association, Inc.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations H-98-19 through -23 in your reply. If you need additional information, you may call (202) 314-6484.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By   
Jim Hall  
Chairman