Log H-517B

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C. 20594

Safety Recommendation

Date: December 13, 1994

In Reply Refer To: H-94-13 and -14

The Governors of the 50 States
and the Mayor of the District of Columbia
(See attached list.)

About 3:28 p.m. on November 10, 1993, near Snyder, Oklahoma, a tractor-semitrailer traveling southbound on U.S. Route 183 struck a 1993 Thomas Built Minotour school bus that was crossing the highway while traveling west on County Line Road. The 20-passenger school bus was occupied by the driver and nine children. The school busdriver said that she stopped at the stop sign and then proceeded to drive across Route 183. The truckdriver stated that the school busdriver hesitated and then pulled out in front of his truck. The school bus was struck in the right side behind the right-front entrance door. Eight children were not wearing the available lapbelts and were ejected. Four of the ejected children died; the injuries of the other four ranged from minor to serious. One child, the only occupant of the bus who was restrained, was not ejected; he received minor injuries. The school busdriver was not ejected, but she was not wearing the lap-shoulder restraint and sustained severe injuries from contact with various parts of the bus interior. The truckdriver, who stated that he was wearing his lapbelt, received minor injuries.[1]

[1] For more detailed information, read Highway Accident Report--*Collision of School Bus with Tractor-Semitrailer near Snyder, Oklahoma, November 10, 1993* (NTSB/HAR-94-04).

The National Transportation Safety Board determines that the probable cause of the accident was that the school busdriver did not see the approaching truck because her view was obstructed, because she had not been provided with an effective strategy or other means for overcoming the view obstruction, and because she may have been distracted by the unruly passengers. However, the board also determines that the truckdriver's failure to observe the speed advisory and the failure of the Cornell Construction Company (Cornell) to systematically maintain the accident truck contributed to the severity of the accident.

Safety Board investigators conducted a postaccident mechanical inspection of the combination unit, which was owned by Cornell. The inspection revealed that four of the six brakes on the tractor and three of the four brakes on the semitrailer were out of adjustment. The investigators also found other defects in the braking system. The S-cam rollers on the brakes on axle 1 had an accumulation of dirt and grease. The brake drums on axle 2 had moderate heat-checking[2] and a 3/8-inch lip between the friction surfaces and the outer edges. A drag test demonstrated that the brake on the right side of axle 2 would not lock the wheel. The brake drum on the left side of axle 3 had minor heat-checking, and the lining on the brakeshoe had a transverse crack that extended from rivet hole to rivet hole. The brake drum on the right side of axle 3 had light heat-checking, and the lining had cracks on both sides. The Safety Board concludes that if the truck brakes had been properly adjusted, the impact forces would have been lower and the crash forces transmitted to the occupants would have been less severe.

Maintenance records on the semitrailer in the accident showed that on May 18, 1993, the suspension system was repaired; on October 15, 1993, the brakeshoes were replaced on the right-rear brake, a wheel seal and brake kit were installed, and the brakes were adjusted. No other records were available for the semitrailer. Records for the tractor indicate that the wiring on the starter was repaired on June 11, 1993. The Cornell vice president stated that much more maintenance had been performed on the tractor but had not been documented. He said he believes that on October 15, 1993, when the semitrailer's brakes were adjusted, the tractor's brakes were adjusted as well. The vice president also told Safety Board investigators that the brakes on Cornell trucks were adjusted on an "as needed" basis and that such work was often postponed until construction projects were completed. The Safety Board concludes that Cornell failed to systematically maintain the accident truck.

During the 10 years preceding the accident, the truckdriver in this accident had received 33 speeding citations in 4 States, many of them while driving a commercial motor vehicle (CMV). His traffic record in Oklahoma for the past 10 years showed 27 convictions for speeding and 6 convictions for other violations: operating an overweight vehicle, failing to stop for a red light, driving the wrong way on a one-way street, operating a motor vehicle without a current license plate, and driving while suspended (twice). His traffic record in Wyoming showed six speeding convictions that had been issued in Oklahoma, Texas, and Kansas between January 1990 and October 1991. Between July 1990 and March 1992, Wyoming suspended his license

[2] Small lines indicating that the brakes had been subjected to extreme heat; heat-checking is usually evidence of emergency braking.

twice and disqualified him from driving a CMV. The truckdriver provided a Texas commercial driver's license (CDL) when he was hired by Cornell in October 1992. His license status in Texas was clear at that time, but if Cornell personnel had requested his traffic records from Oklahoma or Wyoming, they would have found his extensive list of violations. Furthermore, after the truckdriver began working for Cornell, Texas revoked his CDL for serious offenses,[3] and it was still revoked at the time of this accident.

Cornell's files on the truckdriver included a "Motor Vehicle Certification of Violations" form, which noted a $32 fine for one seatbelt violation in a passenger car in February 1993. The truckdriver knew about his record, but he had signed this form, thus certifying "that the following is a true and complete list of traffic violations (other than parking violations) for which I have been convicted or forfeited bond or collateral during the past 12 months." The form was dated October 1992, the month the truckdriver was hired. This accident demonstrates again the unreliability of a self-reporting system for drivers. A driver who has accumulated numerous violations or suspensions is unlikely to risk loss of employment by reporting them to a carrier.

The Safety Board considers the truckdriver's driving record pertinent to this accident. The combination unit was 58 feet long and 8 feet wide. At the time of the accident, the semitrailer was carrying 31,980 pounds of crushed granite, and the estimated weight of the tractor and its loaded semitrailer was 66,500 pounds. The truckdriver stated that he was in 12th gear and estimated his speed at the time of the accident to be between 55 and 60 mph. The speed limit on the highway is 55 mph, but a speed advisory of 45 mph was posted for the section of Route 183 under construction. The Safety Board concludes that the truckdriver did not have sufficient time to avoid the collision. However, the Board also concludes that if the truckdriver had been traveling at the 45 mph advisory speed, the impact forces would have been lower and the crash forces transmitted to the occupants would have been less severe.

Between September 1989 and September 1993, officers from the Oklahoma Motor Carrier Safety Assistance Program (MCSAP) conducted 33 roadside inspections of Cornell vehicles and found 167 driver and vehicle violations. Although MCSAP personnel issued citations and levied fines, Cornell seemed unresponsive because violations previously identified were continually repeated. MCSAP personnel explained that the Oklahoma Department of Public Safety has no authority to place motor carriers out-of-service even after repeated instances of noncompliance with safety regulations. The Board's investigation indicates that roadside inspections, citations, and fines are not sufficient to make motor carriers comply with safety regulations.

[3] According to the Commercial Motor Vehicle Safety Act passed by Congress on October 26, 1986, any speed exceeding the posted limit by 15 mph or more constitutes a serious violation for a CMV.

The Snyder case prompted the Safety Board to reexamine an earlier recommendation. On September 28, 1983, based on several school bus accident investigations, the Board concluded that the protection of school bus passengers in crashes was still a matter of intense concern and recommended that the Governors of the 50 States and the Mayor of the District of Columbia:

H-83-39

> Review State laws and regulations and take any necessary legislative action to ensure that passengers in small (more than 10 passengers and less than 10,000 GVWR) school buses and school vans are required to use available restraint systems whenever the vehicle is in motion; ensure that all users of such vehicles are aware of and comply with these provisions.

According to the responses received, only six states (Louisiana, New Jersey, New Mexico, Virginia, Washington, and West Virginia) require the use of lapbelts on small school buses.

Eight of the passengers in the Snyder school bus were unbelted, and all eight were ejected. Based on the collision dynamics, the physical evidence, and the location of the ejected occupants, the Safety Board believes that the following occupant kinematics probably occurred. The school bus was traveling west through the intersection. When the truck struck the right side of the school bus, its mass and speed caused the school bus to suddenly acquire momentum in a perpendicular direction--south. The unrestrained occupants of the school bus almost immediately collided with the truck, with the right-side interior of the school bus, or with each other. At that point, their momentum, like that of the bus, suddenly changed from westward to southward. Simultaneously, the bus began to rotate clockwise. The unrestrained students, who were now pressed against the right-side interior of the bus, also experienced this rotation. Centripetal force kept them pinned against the right side as the bus rotated while moving south. Some of the occupants might have been partly ejected at this point. The school bus separated from the truck, continued southward, and moved onto the dirt embankment. Its right rear dug into the ground, and the vehicle suddenly lost momentum. Most of the occupants were probably fully ejected at this point as a result of the loss of momentum, the rotational forces, or a combination of both. Five occupants were ejected and thrown clear of the bus. They were followed by three other occupants who were ejected close to the bus. The bus tilted toward its right side and either dragged or ran over these three occupants as it continued down the embankment.

The Safety Board concludes that if the unrestrained passengers had been wearing the available lapbelts, none of them would have been ejected. Prospects for survival might have been better for three of the children who were killed. Two of the children who survived might have received less severe injuries. One seriously injured child who survived might have been killed, depending on her position on the bench seat. For two children--one who received minor injuries and one who was killed--the outcome probably would have been the same.

Safety officials, manufacturers, researchers, and advocates continue to disagree regarding the benefits of lapbelts in both large and small school buses. A 1989 safety study, *Crashworthiness of Small Poststandard School Buses* (NTSB/SS-89/02), concluded that small school buses generally provide good crash protection to both restrained and unrestrained passengers and that seating position is more important than restraint status in determining injury severity. In small school bus accidents, seating position will continue to be an important factor in determining injury severity, and lapbelts probably will not protect occupants in the impact area. In addition, crash test research suggests that in severe frontal school bus collisions, spinal and head injuries can result from the use of lapbelts. Because the data regarding this controversy are inconclusive, the Safety Board will investigate school bus accidents involving restrained children and will focus on the occupant injury-kinematics correlation to determine whether lapbelts provide additional protection or cause injury.

Nonetheless, this accident demonstrates that the use of lapbelts can prevent occupant ejections. In addition, neither the National Highway Traffic Safety Administration nor the National Transportation Safety Board has identified any accident in which a school bus fatality was due to a seatbelt-induced injury. Furthermore, the technological advances in passive and active occupant protection for passenger and commercial vehicles have not been broadly applied to school buses. Therefore, despite the outcome of the school bus lapbelt controversy, the Safety Board reiterates Safety Recommendation H-83-39 to all of the original recipients except the six States in compliance.

As a result of its investigation, the National Transportation Safety Board recommends that the Governors of the 50 States and the Mayor of the District of Columbia:

> Provide the appropriate State agencies with the authority to place a motor carrier out-of-service if a pattern of noncompliance is established. (Class II, Priority Action) (H-94-13)
>
> Require that motor carriers check a driver's record, both initially and at least annually, with State licensing agencies where the driver works and is licensed. (Class II, Priority Action) (H-94-14)

The Safety Board realizes that your State may already be in compliance with one or both of these recommendations. If so, please, let us know which organization in your State government is responsible and how such procedures are enforced.

Also, the Safety Board issued Safety Recommendations H-94-10 and -11 to the National Highway Traffic Safety Administration, H-94-12 to the Federal Highway Administration, H-94-15 and -16 to the National Association of State Directors of Pupil Transportation Service, and H-94-17 to the Cornell Construction Company, 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-83-39 and H-94-13 and -14 in your reply. If you need additional information, you may call (202) 382-6850.

Chairman HALL and Members LAUBER and HAMMERSCHMIDT concurred in these recommendations.

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