FACE-93-06

DATE: June 16, 1993

TO: Director, National Institute for Occupational Safety and Health

FROM: Division of Safety Research, NIOSH

SUBJECT: School Bus Driver Crushed While Preparing to Install Tire Chains on Minibus - Alaska

SUMMARY

A 54-year-old male school bus driver (the victim) died while installing tire chains on a 16-passenger minibus. While driving up a steep, icy hill, the driver was having difficulty controlling the minibus, which began slipping backward before reaching the top. The driver stopped the bus, put it in park, and engaged the emergency brake. He disembarked, walked to the back of the bus, and began installing tire chains. The bus began sliding backward and trapped him under the bumper. The bus then rotated clockwise 90 degrees and continued sliding down the hill into an embankment on the south edge of the roadway, crushing the victim between the bumper and the embankment. Several attempts to rescue the victim were unsuccessful. NIOSH researchers determined that to prevent similar occurrences, employers should:

- *ensure that bus drivers receive training for adverse weather and road conditions and follow proper procedures for tasks such as installing tire chains*
- *consider equipping buses with studded tires for winter driving*
- *ensure that bus drivers are aware of their right to cancel certain routes if adverse road/weather conditions do not permit safe travel.*

INTRODUCTION

On November 6, 1992, a 54-year-old male school bus driver (the victim) died when he became pinned by a 16-passenger minibus while preparing to install tire chains on the vehicle. The vehicle was used to transport developmentally disabled school-age children to school. On November 6, 1992, the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research, Alaska Activity, learned via the State of Alaska Section of Epidemiology, Occupational Injury Prevention Program, of this incident. On November 19, 1992, a safety specialist from the Alaska Activity conducted an investigation at the incident site. The safety specialist reviewed the incident with the State Trooper assigned to the case and the Public Transportation Coordinator for the school district. Photographs were taken of the minibus and the incident site, and an autopsy report was obtained from the local coroner's office. The employer has approximately 150 regular route drivers and 13 activity drivers. The employer has an extensive written safety program that includes the proper method for installing tire chains.

Two in-service training sessions held during the past year covered the proper procedures for installing tire chains. The victim had been working as a bus driver for this company for 2 years; however, this was his first year on this route.

INVESTIGATION

On the day of the incident, the driver and attendant met at the bus barn at 6:30 a.m. when they inspected the bus to ensure the lights, brakes, horn, etc., were working properly. They left the bus barn at approximately 6:50 a.m. for their first pickup. Before approaching the hill, the driver commented to the attendant that they would probably have to install the tire chains to climb the hill. He had successfully installed tire chains on a similar hill the day before. The environmental conditions on the morning of the incident included a temperature of 32 degrees Fahrenheit, darkness, and freezing rain and snow. The snow-packed roadway was covered with a glaze of ice and rain. The grade of the hill ranged from 8.0% to 11.8%; the point on the hill where the bus started sliding had a 9.3% grade.

At 8:30 a.m. the minibus, carrying five developmentally disabled children, started up the hill but began to slide backward before reaching the top. The victim stopped the bus, put it in park, and engaged the emergency brake. He disembarked and walked to the back of the bus while the attendant stayed in the bus with the children. The victim had opened the emergency exit to retrieve the tire chains and using the same procedure as the day before, had started to install the chains when the bus began sliding backward, trapping him under the bumper (Figure 1). The attendant, who thought that the victim had stepped out of the way, ran up the aisle, to the driver's seat and pumped the brakes to try to stop the bus from sliding. The minibus slid approximately 15 feet, then it rotated clockwise 90 degrees and slid another 15 to 25 feet down the hill into an embankment on the south edge of the roadway, pinning the victim between the bumper and embankment.

The attendant ran to the back of the bus, looked out the window, and saw the victim's legs behind the left rear tire. She radioed for help and emergency personnel were dispatched.

An eyewitness who was reading the newspaper in his car at the bottom of the hill noticed that the bus had slid down the hill and was now crosswise in the road. He ran up the hill to offer assistance and discovered the driver pinned between the bumper and the embankment. The attendant asked the eyewitness to try to move the bus, but when he tried putting the bus in drive, it wouldn't move. He didn't realize the emergency brake was engaged.

The emergency crew arrived in approximately 10 to 15 minutes. Using a come-a-long, they secured the minibus to a tree on the north side of the road and then escorted the children from the bus. The bus was moved off the victim. The emergency crew tried unsuccessfully to resuscitate the victim, who was pronounced dead.

The State Trooper's inspection of the minibus revealed the tires to be fully inflated and in good condition. The tires were siped, however, and were not equipped with studs. Sipes are any of the small, often hook-shaped or bracket-shaped grooves in the tread of an automobile tire for providing extra traction and preventing skids.

CAUSE OF DEATH

The autopsy indicated that the victim died as a result of compression asphyxia.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that bus drivers receive training for adverse weather and road conditions and follow proper procedures for tasks such as installing tire chains.

Discussion: The employer did arrange for two in-service training sessions in the past year that covered proper procedures for installing tire chains. Training was also provided for school bus drivers in safe bus handling during adverse road and weather conditions. The proper installation and use of safety equipment was also included in this training.

Chains should be installed on level ground, never when the vehicle is sitting on an incline. The chains should have been installed at the bottom of the hill either before traveling up the hill or after backing down when the first attempt to climb the hill was unsuccessful.

Recommendation #2: Employers should consider equipping buses with studded tires for winter driving.

Discussion: A 1992 study by the Swedish Road and Traffic Research Institute states that studded snow tires reduce the risk of involvement in slippery road incidents by 20% to 50% (1). In locations where ice and snow cover the roads during the majority of the school year, consideration should be given to routinely installing studded tires on school buses for winter driving. Reinforced tire chains provide even better traction and should be used when necessary. In the state of Alaska, school districts are required to equip their buses with studded tires; however, school districts may petition for a waiver and equip buses with siped tires instead.

Recommendation #3: Employers should ensure that bus drivers are aware of their right to cancel certain routes if adverse road/weather conditions do not permit safe travel.

Discussion: Section 108.0 (A) (1) (a) of the School District Pupil Transportation Handbook, issued to all district bus drivers, including operator's of full- and mini-size buses, states:

> "… School bus drivers have the authority and responsibility to determine when road conditions are not safe for school bus travel. Under Mode 1 (normal conditions), if the bus driver determines a portion of the regular route to be impassable, the driver must advise the Bus Barn Dispatcher by radio of the area the bus cannot travel."

Full-size buses do not travel the section of the road where the incident occurred. They pick up their students in a large "turn around" area at the base of the hill. The drivers of these buses did, however, report icy conditions on this road via radio earlier that morning.

The school district administrators decide if weather conditions are severe enough to close schools; however, on days when the administrators decide to keep the schools open, the condition of certain roads may not allow safe travel. In this instance, this particular road could have been determined unsafe for travel and the dispatcher advised that other arrangements would have to be made for transporting the student who lived over the hill, including not picking him up at all.

REFERENCES

Junghard, Ola. Estimating the Traffic Safety Effect of Studded Tires. Accid. Anal. and Prev. Vol. 24, No. 4, pp. 357-361, 1992.

1992-1993 Drivers Handbook. School District Pupil Transportation Handbook, Section 108.0 (A) (1) (a) pg. 37.

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Fatal Accident Circumstances and Epidemiology (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

States participating in this study: Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

Additional information regarding this report is available from:

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