



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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**Date:** January 14, 2000

**In reply refer to:** H-00-10

Mr. Victor S. Parra  
Executive Director and Chief Operating Officer  
United Motorcoach Association  
113 South West Street  
Alexandria, Virginia 22314-2824

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About 4:05 a.m. on June 20, 1998, a 1997 Motor Coach Industries 47-passenger motorcoach, operated by Greyhound Lines, Inc., was on a scheduled trip from New York City to Pittsburgh, Pennsylvania, traveling westbound on the Pennsylvania Turnpike near Burnt Cabins, Huntingdon County, Pennsylvania. As the bus approached milepost 184.9, it traveled off the right side of the roadway into an “emergency parking area,”<sup>1</sup> where it struck the back of a parked tractor-semitrailer, which was pushed forward and struck the left side of another parked tractor-semitrailer. Of the 23 people on board the bus, the driver and 6 passengers were killed; the other 16 passengers were injured. The two occupants of the first tractor-semitrailer were injured, and the occupant of the second tractor-semitrailer was uninjured.<sup>2</sup>

The National Transportation Safety Board determined that the probable cause of this accident was the busdriver’s reduced alertness resulting from ingesting a sedating antihistamine and from his fatigued condition resulting from Greyhound Lines, Inc., scheduling irregular work-rest periods. Contributing to the severity of the accident was the Pennsylvania Turnpike Commission’s practice of routinely permitting nonemergency parking in pull-off areas within the highway clear zone.

The schedule selected by the busdriver resulted in an irregular work-rest cycle.<sup>3</sup> The busdriver’s on-duty time commenced anywhere between 9:00 p.m. and 1:30 a.m., and his off-duty time began anywhere between 9:00 a.m. and 12:30 p.m. The Safety Board has previously addressed the issue of operator fatigue involving irregular work-rest schedules in its 1995 safety

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<sup>1</sup> The 28-foot-wide 1,000-foot-long area off the roadway was used for vehicular parking.

<sup>2</sup> For further information, see National Transportation Safety Board. 2000. *Greyhound Run-off-the-Road Accident, Burnt Cabins, Pennsylvania, June 20, 1998*. Highway Accident Report NTSB/HAR-00/01. Washington, D.C.

<sup>3</sup> A driver’s work-rest hours are classified as irregular if the start times of two consecutive duty periods and the start times of two consecutive sleep periods both vary by 2 or more hours at least twice during a 96-hour period.

study on heavy truck accidents.<sup>4</sup> In the subset of these accidents for which sleep data were available, the Safety Board found about 67 percent of the drivers (43 of 64) with irregular schedules were involved in fatigue-related accidents, compared with about 38 percent of drivers (9 of 24) with regular schedules. The Safety Board found that irregular schedules could result in longer hours awake than normal and, without careful planning, prevent drivers from obtaining adequate sleep.

The busdriver was in the 4th day of a 4-day schedule, during which he slept in the daylight hours and drove in the nighttime hours, contrary to his usual off-day routine. Research has shown that nightshift work schedules are generally more tiring for workers than dayshift work schedules, with nightshift workers usually getting less uninterrupted sleep per day.<sup>5</sup> In addition, the accident occurred at approximately 4:05 a.m., the time of day when a driver would be most likely to experience sleepiness and a loss of alertness due to the body's circadian rhythm.<sup>6</sup>

The busdriver had previously been observed to have difficulty staying awake during nighttime driving. Six months before the accident, a passenger witnessed episodes of drowsiness on the part of the driver during which he repeatedly drifted off the roadway, was alerted by contact with rumble strips, and then steered back onto the roadway. In addition, shortly before the accident occurred, an off-duty State trooper observed a Greyhound bus drifting onto the right shoulder and returning to the roadway about 0.5 mile from the accident site, suggesting that this bus was the one driven by the driver in this accident.

The motorcoach departed the roadway at an angle of approximately 3 degrees. The shallowness of the angle suggests that the vehicle drifted from the roadway as the driver was falling asleep.<sup>7</sup> The 28-foot tire marks discovered at the scene of the accident by Safety Board investigators, matching the departure angle of the bus, were included in a computer simulation of the accident. The results of this simulation supported the judgement that the marks originated from the accident bus. These marks suggest that the driver did not react quickly enough to apply the brakes until it was too late to avoid the collision.

Furthermore, the busdriver had complained to his physician in November 1997 about difficulty sleeping, stating that he was able to sleep only 3 to 4 hours before waking. This suggests that the driver might have accumulated a substantial sleep debt by the 4th day of his shift, resulting in a highly fatigued state.<sup>8</sup> Insomnia may have contributed to his fatigue; research shows that "the more sleep is disturbed or reduced for whatever reason, the more likely an individual will

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<sup>4</sup> National Transportation Safety Board. 1995. *Factors that Affect Fatigue in Heavy Truck Accidents*. Safety Study Report NTSB/SS-95/01. Washington, D.C.

<sup>5</sup> McDonald, N., *Fatigue, Safety and the Truck Driver*. Long: Taylor and Francis. 1984.

<sup>6</sup> Circadian rhythm describes the regular recurrence, in cycles of about 24 hours, of biological processes or activities, such as sensitivity to drugs and stimuli, hormone secretion, sleeping, and feeding. This rhythm seems to set by a "biological clock" that appears to be set by recurring daylight and darkness. Also see Rosekind, M.R., *Fatigue in Transportation: Physiological, Performance, and Safety Issues*. Prepared for the National Transportation Safety Board. Washington, DC. April 1999.

<sup>7</sup> Knipling, R.R., and Wang, J.S., "Crashes and Fatalities Related to Driver Drowsiness/Fatigue." *Research Note*. November 1994. National Highway Traffic Safety Administration. Washington, DC.

<sup>8</sup> Safety Study Report NTSB/SS-95/01.

inadvertently slip into sleep.”<sup>9</sup> Losing as little as 2 hours of sleep can negatively affect alertness and performance, leading to degraded judgment, decisionmaking, and memory; slowed reaction time; lack of concentration; fixation; and irritability.<sup>10</sup>

The Safety Board concluded that because of the scheduled irregular work-rest cycle and possible sleeping difficulties, the busdriver may have developed a sleep debt over the 4 days of his shift, which was exacerbated by a reduced alertness corresponding to his body’s circadian rhythm. The combined result of these factors may have contributed to the busdriver’s sleepiness and reduced alertness, causing him to drift off the roadway and collide with the tractor-semitrailer parked in the adjacent emergency parking area. Therefore, the Safety Board believes that the United Motorcoach Association (UMA) should advise its members of the facts and circumstances of this accident and encourage them, if they do not already do so, to revise their driver scheduling practices to reduce scheduling variability that results in irregular work-rest cycles.

The Safety Board’s examination of the busdriver’s driving record indicated that he had three speeding violations, one each in 1989, 1992, and 1994. The 1992 and 1994 violations occurred while he was operating a bus. In addition, between 1990 and 1996, he had been involved in nine motor vehicle accidents, varying in severity, while operating a bus. In one of these accidents in 1995, he was ticketed for an unsafe lane change.

However, the busdriver’s records also disclosed that between April 1988 and January 1994, he had received five Greyhound safe driving awards. These awards were issued during a period in which the driver, while operating a bus, had been involved in four accidents and had received a speeding ticket. Currently, Greyhound’s safe driver program awards drivers solely for completing 6 or 12 consecutive months of driving without a preventable accident; the program does not consider traffic violations in the award process.

The Safety Board concluded that the effectiveness of the Greyhound safety oversight program is lessened by not considering traffic violations in driver safety assessments. The Safety Board believes that the UMA should encourage its members, if they do not already do so, to include all traffic violations in their drivers’ records and consider these violations during driver safety assessments.

Therefore, the Safety Board recommends that the United Motorcoach Association:

Advise its members of the facts and circumstances of this accident and encourage them, if they do not already do so, to 1) revise their driver scheduling practices to reduce scheduling variability that results in irregular work-rest cycles and to 2) include all traffic violations in their drivers’ records and consider these violations during driver safety assessments. (H-00-10)

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<sup>9</sup> Mitler, M., Carskadon, M., Czeisler, C. et al., “Catastrophes, Sleep, and Public Policy: Consensus Report,” *Sleep* 11, 1988.

<sup>10</sup> *Fatigue Resource Directory*. Website: <<http://olias.arc.nasa.gov/zteam/fredi/home-page.html>>. Compiled in conjunction with the NASA/NTSB Symposium *Managing Fatigue in Transportation: Promoting*

Also, the Safety Board issued Safety Recommendations H-00-01 and -02 to the National Highway Traffic Safety Administration; H-00-03 through -05 to the Pennsylvania Turnpike Commission; H-00-06 through -09 to Greyhound Lines, Inc.; and H-00-11 to the American Bus Association.

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 within 90 days regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation H-00-10 in your reply. If you need additional information, you may call (202) 314-6440.

Chairman HALL and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

By: Jim Hall  
Chairman