



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: January 14, 2000

In reply refer to: H-00-06 through -09

Mr. Jack Haugslund
Chief Operating Officer
Greyhound Lines, Inc.
Post Office Box 660362
Dallas, Texas 75266-0362

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,”¹ 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.²

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.³ 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

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

² 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.

³ 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.⁴ 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.⁵ 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.⁶

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.⁷ 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.⁸ 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

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

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

⁶ 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.

⁷ Knippling, 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.

⁸ Safety Study Report NTSB/SS-95/01.

inadvertently slip into sleep.”⁹ 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.¹⁰

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 Greyhound should revise driver scheduling practices to reduce scheduling variability that results in irregular work-rest cycles.

Although speeding was not a factor in this accident, the Safety Board found during its investigation that busdriver speeding was prevalent throughout the Greyhound system. Safety Board investigators observed Greyhound operations at 10 terminals in different locations throughout the United States and determined that excessive speeding on the part of drivers was systemwide and not restricted to a specific operational area or geographical region. On the 40 trips that investigators observed, all 40 drivers were speeding at some time during their trips. Greyhound safety officials observed an additional 140 buses, all of which exceeded the posted speed limits. In all, 100 percent of the 180 buses observed by Safety Board investigators and Greyhound safety officials were involved in speeding. Although Greyhound buses were equipped with speed-limiting devices for the engines, the buses could exceed the governed speed on downhill grades.

The Greyhound safety oversight system relies on log book audits of hours-of-service, limited observations of drivers, and the 1-800-SAFEBUS program. But Greyhound’s analysis of driver logs does not appear to be successful in detecting abnormal or excessive speed. The calculations based on the logs of 35 of the 40 drivers that the Safety Board observed speeding revealed varying and highly unlikely average speeds, such as three drivers who averaged 20 to 25 mph on a run, one driver who averaged 120 mph, and another driver who averaged 247 mph.

While busdrivers’ speeding was found to be prevalent throughout the Greyhound system, the company has not employed all available means, such as monitoring drivers’ violations and analyzing drivers’ logs, to identify speeding and other unsafe driving practices. Therefore, the Safety Board concluded that Greyhound’s current operational oversight program is inadequate to detect and correct the widespread speeding of its busdrivers. Consequently, the Safety Board believes that Greyhound should include in its drivers’ assessment programs all driver traffic and logbook violations.

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

¹⁰ *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 Safety and Productivity* and managed by the DOT. Also, *Online Medical Dictionary*. Website: <<http://www.graylab.ac.uk/omd/contents/F.html>>.

At the time of the accident, Greyhound had chosen not to activate the data pages option of the Detroit Diesel Electronic Controls (DDEC) III electronic control module (ECM) units. In the inactive condition, the data pages information was still being captured but could be accessed only by the manufacturer. According to the Greyhound senior vice president of operations, Greyhound did not perceive a need for using the data pages recording option. The ECM data collected during routine preventative maintenance periods were extracted not to obtain driver practices information and speed history but strictly to determine that the governed speed of the buses had not been tampered with and to monitor fuel consumption.

Safety Board examination of the accident coach's ECM data, which the Detroit Diesel Corporation had extracted, prompted concern about the speeds at which the accident coach had been operated over the last several months. The ECM data downloaded from the accident bus indicated that it had traveled at speeds as high as 76 mph on the day of the accident. For the previous 90 days, the data also revealed 15 instances in which the coach's speed ranged between 80 and 90 mph and 34 instances in which the speed ranged between 71 and 80 mph. This same information was readily available to Greyhound to assist the company in its driver oversight program.

According to the Greyhound vice president of operations, Greyhound plans to have older engines remanufactured and equipped with DDEC III ECM units. By spring 2000, the company expects to be operating between 1,500 and 1,700 coaches with DDEC III and IV ECM units. In November 1999, Greyhound's safety director informed the Safety Board that because of privacy issues, Greyhound has no plans to use the data pages option of the ECM units for driver oversight.

The ECM data were a powerful investigative tool for the Safety Board during this investigation. While a useful tool for accident investigation, its best use would be for accident prevention. Present day technology, as well as related emerging technologies, provides the Safety Board and corporate safety officials with very important fact-gathering tools. However, unless these systems are in place and their use mandated, the data will be overlooked or unavailable. The Safety Board concluded that, by not establishing a policy to activate and use the data pages option of the ECM units, Greyhound is severely degrading its ability to oversee driver and vehicle operations safety. The Safety Board believes that Greyhound should use all current and future data monitoring and storage capabilities of ECMs, electronic control units, and similar technologies to enhance vehicle and driver oversight programs by engaging the specific capabilities of each individual unit's programmed or programmable functions to collect and monitor data including, but not limited to, vehicle speed, revolutions-per-minute, hard-brake or sudden decelerations, and other parameters of vehicle and engine operations.

In its safety manual, Greyhound describes the 1-800-SAFEBUS program as its driver safety check program. The purpose of the program is to allow the public to notify the company, using a toll-free telephone number, about driver performance, service, and driving behavior. The program is intended to make Greyhound aware of a driver's unsafe driving practices and allow the company to initiate a follow-up investigation or review of the complaints received.

Although a number of problems identified by the Safety Board, such as not recording calls and not including all complaint information in a file report, were rectified, according to

Greyhound, when Fleetsafe purchased Safetynet, the Safety Board is concerned that Greyhound is not using the complaints received through the 1-800-SAFEBUS program to their full potential as a driver assessment tool. According to Greyhound, complaints are filed at a driver's home terminal but not included in that driver's personnel or qualification files, and the driver's supervisor is not required to act on a complaint. The Greyhound safety department may initiate disciplinary action for a driver who is repeatedly listed on 1-800-SAFEBUS monthly reports, presenting the possibility that a driver problem may continue for several months before action is taken. In addition, the omission of 1-800-SAFEBUS complaints from personnel files makes it more difficult for Greyhound to take a proactive stance on preventing unsafe driver practices.

When a 1-800-SAFEBUS complaint is received from an identified caller who leaves a telephone number, the Greyhound safety department is notified. However, if a complaint is received from an anonymous caller, the complaint is not processed, and the safety department is not notified; therefore, no further action is taken. Not recording all complaints increases the likelihood that unsafe driving practices will continue unchecked. The Safety Board concluded that Greyhound's policy of disregarding anonymous calls to 1-800-SAFEBUS prevents the company from identifying patterns of unsafe driving practices by particular drivers or on particular runs and diminishes the potential safety oversight benefits of this program. Including all complaints in driver personnel files would enable Greyhound to better detect an operator problem and act to eliminate it before an accident occurs. Receiving and following up on all calls received through the 1-800-SAFEBUS program would allow more encompassing safety oversight. Consequently, the Safety Board believes Greyhound should revise its 1-800-SAFEBUS program to ensure that all complaints are included in drivers' files and used in drivers' assessments.

Therefore, the National Transportation Safety Board recommends that Greyhound Lines, Inc.:

Revise your driver scheduling practices to reduce scheduling variability that results in irregular work-rest cycles. (H-00-06)

Include in your drivers' assessment programs all driver traffic and logbook violations. (H-00-07)

Use all current and future data monitoring and storage capabilities of electronic control modules, electronic control units, and similar technologies to enhance vehicle and driver oversight programs by engaging the specific capabilities of each individual unit's programmed or programmable functions to collect and monitor data including, but not limited to, vehicle speed, revolutions-per-minute, hard-brake or sudden decelerations, and other parameters of vehicle and engine operations. (H-00-08)

Revise your 1-800-SAFEBUS program to ensure that all complaints are included in drivers' files and used in drivers' assessments. (H-00-09)

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-00-10 to the United Motorcoach Association, 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 recommendations in this letter. Please refer to Safety Recommendations H-00-06 through -09 in your reply. If you need additional information, you may call (202) 314-6440.

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

By: Jim Hall
Chairman