



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: December 17, 2007

In reply refer to: H-07-41 and -42

Honorable John H. Hill
Administrator
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On Friday, July 16, 2004, about 12:00 p.m., a 1999 Sterling tractor towing a 1997 Great Dane semitrailer was part of a traffic queue moving slowly¹ east on Interstate 94 (I-94), behind a 2004 Saturn station wagon approaching the Fletcher Road overpass near Chelsea, Michigan. The queue had formed following an earlier accident in the eastbound lanes of a highway maintenance zone. At the same time, a 2000 Kenworth tractor towing a 2000 Hyundai semitrailer, owned by Equity Transportation Company, Inc. (Equity), was traveling behind the queue on I-94, approaching the Fletcher Road overpass at a witness-estimated speed of 60 mph. The Kenworth driver failed to slow in time for the traffic queue ahead. A 115-foot preimpact skid mark indicated that the Kenworth driver applied the brakes and swerved to the right just before his truck collided with the Sterling's semitrailer. The left front of his truck struck the right rear of the Sterling's semitrailer, compressing the cab of the Kenworth about 6 feet to the rear, trapping and fatally injuring its driver. The impact propelled the Sterling tractor-semi-trailer into the Saturn in front of it, resulting in minor injuries to the Sterling driver and to a passenger in the Saturn.²

The National Transportation Safety Board determined that the probable cause of the July 16, 2004, multiple-vehicle accident near Chelsea, Michigan, was the accident driver's failure to stop upon encountering traffic congestion in a temporary traffic control zone likely due to a reduced state of alertness associated with failure to obtain adequate rest. Contributing to the accident were Equity Transportation Company, Inc.'s, insufficient regard for, and oversight of, driver compliance with Federal commercial motor vehicle hours-of-service regulations, which endangered the safety of its drivers and the traveling public; the Federal Motor Carrier Safety Administration's failure to require motor carriers to use tamperproof driver's logs; and the Michigan Department of Transportation's failure to conduct a merge traffic capacity analysis as part of a bridge rehabilitation project.

¹ According to the driver of the Sterling tractor, traffic slowed from 70 mph to 30 mph about a mile before the accident location.

² For additional information, see National Transportation Safety Board, *Rear-End Chain Reaction Collision, Interstate 94 East, Near Chelsea, Michigan, July 16, 2004*, Highway Accident Brief NTSB/HAB-07/01 (Washington, DC: NTSB, 2007) at <http://www.nts.gov/publictn/2007/HAB0701.pdf>.

During its investigation, the Safety Board identified the following factors that contributed to this accident, each of which will be discussed below:

- Lax motor carrier oversight of drivers and
- Insufficient regulatory requirements to ensure accountability for record-of-duty-status logs.

Driver Oversight

Safety Board investigators reconstructed the Kenworth driver's activities before the accident using global positioning system (GPS) electronic data obtained from Equity, the driver's employer. The GPS installed in the Kenworth automatically tracked the time and location of the truck at least once an hour, as well as the vehicle's latitude, longitude, and ignition status. This information was collected without additional input from the driver. The reconstruction revealed that the driver had been on duty continuously for 19.75 hours, from 4:15 p.m. on July 15 until the accident about 12:00 p.m. on July 16, exceeding the maximum time allowed by Federal regulations by 5.75 hours. The driver had also driven almost 14 cumulative hours during the 19.75-hour on-duty period without resting, nearly 3 hours beyond the time allowed by Federal regulations.³ (In contrast, one of the driver's paper log entries for July 16 indicated that he had been in his sleeper berth for 6.25 hours and had been on duty for 4.75 hours, of which 4 hours were spent driving.)

Research has shown that a combination of reduced sleep and fatigue from long-distance driving can significantly increase reaction time.⁴ While individuals experiencing sleep loss can usually rally momentarily to perform at their non-sleep-deprived levels, their ability to maintain that performance decreases as the length of the task increases.⁵ Furthermore, the longer a person is continually awake beyond 14 to 16 hours, the greater the occurrence and duration of attention lapses.⁶ Driver sleepiness and fatigue have been strongly linked with commercial vehicle crashes by the Safety Board and others.⁷

³ Title 49 *Code of Federal Regulations* (CFR) Part 395 states that a driver may be on duty for up to 14 hours, of which 11 hours can be spent driving, only after spending 10 consecutive hours off duty. A driver may not drive after accumulating 60/70 hours on duty in 7/8 consecutive days without being off duty for 34 or more consecutive hours.

⁴ Pierre Philip and others, "Fatigue, Sleep Restriction, and Performance in Automobile Drivers: A Controlled Study in a Natural Environment," *SLEEP*, Vol. 26, No. 3 (2003): 277–280.

⁵ Michael Bonnet, "Sleep Deprivation," eds. M.H. Kryger, T. Roth, and W.C. Dement, *Principles and Practice of Sleep Medicine*, Third Edition (Philadelphia, PA: W.B. Saunders Company, 2000).

⁶ National Transportation Safety Board, *Fatigue Symposium Proceedings*, November 1–2, 1995, RP-95-02 (Washington, DC: NTSB and National Aeronautics and Space Administration Ames Research Center, 1995) 42.

⁷ (a) European Transport Safety Council, *The Role of Driver Fatigue in Commercial Road Transport Crashes* (Brussels: ETSC, 2001). (b) *Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue*, Safety Report NTSB/SR-99/01 (Washington, DC: NTSB, 1999). (c) National Transportation Safety Board, *Analysis*, Vol. 1 of *Factors That Affect Fatigue in Heavy Truck Accidents*, Safety Study NTSB/SS-95/01 (Washington, DC: NTSB, 1995). (d) U.S. Department of Transportation, J.S. Wang and R.R. Knipling, *Single Vehicle Roadway Departure Crashes: Problem Size Assessment and Statistical Description*, Report No. DOT-HS-808113 (Washington, DC: USDOT, 1994). (e) National Transportation Safety Board, *Fatigue, Alcohol, Other Drugs, and Medical Factors in Fatal-to-the-Driver Heavy Truck Crashes*, Safety Study NTSB/SS-90/01 (Washington, DC: NTSB, 1990).

According to Equity's safety director, the company has a log review program in place under which it electronically scans the written logs of all its drivers and checks them for hours-of-service violations. Additionally, 50 percent of the logs are verified by comparing them with supporting documentation such as fuel receipts, toll receipts, and driver trip information. The logs of drivers placed out of service during roadside inspections or involved in accidents are included in the verification process. Equity drivers who violate hours-of-service regulations may be disciplined by having their tractor's top speed reduced,⁸ by not being reimbursed for expenses, by being suspended, or by being dismissed. Although the apparent objective of Equity's log review program is to deter drivers from violating Federal hours-of-service regulations, during a 2004 postaccident review of 17 sets of paper and electronic records of Equity drivers,⁹ Safety Board investigators found violations within all 17 sets. Among these violations were 51 false entries, 1 violation of the illegible log rule, 1 violation of the 70-hour driving rule, 5 violations of the 14-hour driving rule, and 6 violations of the 11-hour driving rule.

From July 18, 2002, through July 18, 2004, Equity drivers underwent 500 roadside inspections that resulted in 76 drivers being placed out of service. The resulting 15.2-percent out-of-service rate may be compared to the national driver out-of-service rate of 7.2 percent. Of the 76 drivers who were placed out of service, 73 had violated at least one Federal hours-of-service regulation.

The FMCSA has taken enforcement action against Equity three times in the past 11 years for hours-of-service violations. Equity was fined in February 1996 and again in February 2003 for falsification of drivers' logs. The FMCSA had already planned to conduct a compliance review of Equity prior to the Chelsea accident in response to charges by two former drivers that Equity had scheduled runs requiring drivers to exceed Federal hours-of-service regulations.¹⁰ This compliance review, the results of which were issued on July 27, 2004, and which resulted in a conditional rating, uncovered a 20-percent falsification rate for drivers' logs. Other log violations included permitting drivers to exceed 11 hours driving after 10 consecutive hours off duty, to exceed 14 hours on duty after 10 consecutive hours off duty, and to drive more than 70 hours in an 8-day period.

The accident driver's son, a former Equity driver who resigned from the company following his father's death, told Safety Board investigators that Equity dispatchers routinely pressured drivers to exceed the on-duty limits stipulated by Federal regulations. He cited an example of a 710-mile trip from Walker, Michigan, to East Greenville, Pennsylvania, that Equity scheduled as one trip. The driver would have to drive at an average speed of 64 mph to complete the trip in 11 hours. However, this average speed is not possible because about 180 miles of the trip are in Michigan, where the maximum speed limit for trucks is 55 mph. PC*Miler¹¹ estimates

⁸ An Equity vehicle's normal electronically regulated speed of 67 mph would be reduced to 64 mph.

⁹ Safety Board investigators examined the paper logs and supporting documents of 11 drivers who drove frequently from July 27 through August 3, 2004. Paper records and electronic data for six drivers were also examined for the period from August 30 through September 7, 2004. (One driver's records were reviewed during both examinations.)

¹⁰ The allegations concerning scheduling could not be verified during the compliance review due to a lack of supporting documents. As a result of the review, however, Equity was fined for unrelated hours-of-service violations.

¹¹ *PC*Miler* is a popular routing, mileage, and mapping software used throughout the motor carrier industry.

a driving time of 12 hours, 15 minutes, at an average speed of 58 mph for the trip. This routinely scheduled trip was also identified in the complaint filed by the two former drivers.

The driver's son also stated that if a driver refused a trip for hours-of-service reasons or expressed a concern to Equity dispatchers that a trip would result in a violation of hours-of-service regulations, dispatchers forced that driver to sit for a couple of days without a trip, resulting in lost income. He further stated that, consequently, drivers routinely revised their paper log entries to show compliance with hours-of-service regulations. The loose-leaf log system used by Equity allowed the drivers to make these hours-of-service adjustments without creating an identifiable paper trail of corrected or revised logs.

Although Equity asserted that the company has a safety management program in place that identifies and disciplines drivers who exceed Federal hours-of-service limits, Equity's history of hours-of-service violations, driver statements regarding scheduled runs that exceed on-duty limits, and numerous false driver logs discovered by the FMCSA and the Safety Board suggest that this program has been ineffective. The Safety Board therefore concludes that Equity operated with insufficient regard for, and oversight of, driver compliance with Federal commercial motor vehicle hours-of-service regulations, thereby endangering the health and safety of its drivers, as well as the safety of the traveling public.

Since July 2004, the FMCSA has conducted two more compliance reviews of Equity and rated the carrier satisfactory on both occasions.¹² Although Equity may have made substantive improvements in its driver oversight program since the Chelsea accident, it is difficult for the Safety Board to make such a determination based solely on the FMCSA compliance review program, due to limitations in the program's ability to identify unsafe carriers, as evidenced by previous Safety Board investigations.¹³ In 1995, for example, the Safety Board investigated a fatal motorcoach accident that involved a carrier with a 9-year history of repeated hours-of-service and vehicle-related violations.¹⁴ Despite the carrier's record, the Office of Motor Carriers¹⁵ continued to rate the carrier satisfactory in its compliance reviews. As a result, the Safety Board issued the following safety recommendation to the U.S. Department of Transportation:

H-99-6

Change the safety fitness rating methodology so that adverse vehicle and driver performance-based data alone are sufficient to result in an overall unsatisfactory rating for the carrier.

¹² The compliance reviews were conducted in August 2005 and March 2007.

¹³ (a) National Transportation Safety Board, *Collision Between Truck Tractor Semitrailer and School Bus near Mountainburg, Arkansas, May 31, 2001*, Highway Accident Report NTSB/HAR-02/03 (Washington, DC: NTSB, 2002). (b) National Transportation Safety Board, *Motorcoach Run-off-the-Road and Rollover off Interstate 90, Victor, New York, June 23, 2002*, Highway Accident Report NTSB/HAR-04/03 (Washington, DC: NTSB, 2003). (c) National Transportation Safety Board, *Motorcoach Fire on Interstate 45 During Hurricane Rita Evacuation Near Wilmer, Texas, September 23, 2005*, Highway Accident Report NTSB/HAR-07/01 (Washington, DC: NTSB, 2007).

¹⁴ National Transportation Safety Board, *Selective Motorcoach Issues*, Special Investigation Report NTSB/SIR-99/01 (Washington, DC: NTSB, 1999).

¹⁵ The Office of Motor Carriers is now the FMCSA.

The Safety Board has twice reiterated Safety Recommendation H-99-6, most recently in response to the Wilmer, Texas, bus fire accident,¹⁶ and it is currently classified “Open—Acceptable Response.” This recommendation is on the Safety Board’s List of Most Wanted Transportation Safety Improvements.¹⁷

In a 2006 response to Safety Recommendation H-99-6, the FMCSA stated that, as part of its Comprehensive Safety Analysis (CSA) 2010 Initiative, it is reviewing the compliance review process and developing a new safety fitness rating methodology based on an objective measure of driver or carrier safety performance data. The FMCSA expects to deploy the new methodology by 2010. In its reply to the FMCSA, the Safety Board noted that even if the FMCSA achieves its milestone, the expected time frame for implementation of the new program is several years away. In the interim, deficiencies in the current compliance review system allow unsafe carriers to operate and should be remedied to protect the traveling public. Therefore, on June 22, 2007, the Safety Board issued a safety recommendation that asked that the FMCSA,

H-07-3

To protect the traveling public until completion of the Comprehensive Safety Analysis 2010 Initiative, immediately issue an Interim Rule to include all *Federal Motor Carrier Safety Regulations* in the current compliance review process so that all violations of regulations are reflected in the calculation of a carrier’s final rating.

Safety Recommendation H-07-3 is classified “Open—Await Response.”

Log Accountability

The accident vehicle, like all Equity trucks, was equipped with a GPS. Equity does not use electronic data to track or confirm driver duty hours, and there are no Federal regulations requiring carriers such as Equity to do so. According to the Equity safety director, the GPS data are typically stored only for about 2 or 3 days because of limited electronic storage. The GPS transmits vehicle location and driver information to Equity at least once an hour, without manual input from the driver, granting a degree of objectivity and validity to the data. Because the data transmissions from the accident vehicle were recorded and stored by Equity at its facility (temporarily), they survived and were accessible postaccident despite the destruction of the truck cab. As a result, Safety Board investigators were able to accurately reconstruct the duty status of the driver prior to his involvement in the Chelsea accident. The Safety Board concludes that the survival and availability of the electronic data from the accident vehicle were invaluable in the reconstruction of events leading to the Chelsea accident and in the assessment of the accident driver’s hours-of-service status.

In January 2007, the FMCSA published a notice of proposed rulemaking (NPRM) that would require motor carriers with a “demonstrated history of serious noncompliance with hours-of-service (HOS) rules” to be subject to mandatory installation of electronic on-board

¹⁶ NTSB/HAR-07/01.

¹⁷ The Safety Board’s “Most Wanted” program was established to increase the public’s awareness of and support for action to adopt safety steps that can help prevent accidents and save lives.

recorders (EOBRs) meeting proposed standards of accuracy, validity, and security.¹⁸ A carrier would be recognized as a pattern violator of hours-of-service regulations if it is found to have a violation rate of 10 percent or more of any regulation currently listed in Part 385, Appendix B, Section VII, of the *Federal Motor Carrier Safety Regulations* during any two compliance reviews performed over a 2-year period. Carriers identified as pattern violators would be required to use EOBRs, instead of paper logs, to track and record driver hours of service for a period of 2 years.

According to the NPRM, pattern violators would be identified exclusively via compliance reviews. In 2005, the FMCSA performed 8,097 compliance reviews on a population of approximately 911,000 active and registered motor carriers, which means that less than 1 percent of carriers were assessed for safety and fitness. Moreover, flaws in the compliance review procedures guarantee that if the NPRM provisions were implemented, many unsafe carriers would continue to evade even initial identification as an hours-of-service violator.

In the case of Equity, although it was cited for hours-of-service violations in the July 2004 compliance review, it would not be identified as a pattern violator under the proposed rules because it consistently received satisfactory ratings prior to and since the accident, despite a history of hours-of-service violations. In light of deficiencies in the FMCSA motor carrier compliance review program, the Safety Board does not believe that the FMCSA has the resources or processes necessary to identify and discipline all carriers and drivers who are pattern violators of the hours-of-service regulations. Consequently, a program to impose EOBRs on pattern violators that relies on the current compliance review program to identify such carriers seems unlikely to be successful.

The FMCSA outlined a series of financial and regulatory incentives in the NPRM to persuade carriers to install EOBRs in their motor vehicles voluntarily. However, the Safety Board is unconvinced that these incentives are sufficient to override the financial motivation that pattern violators have for continuing to circumvent hours-of-service regulations and to not use EOBRs for tracking hours of service. Additionally, the Safety Board is concerned that the NPRM proposes using EOBRs as a form of remediation or punishment, when the technology has significant potential for increasing the safety of all motorists. Encouraging motor carriers to perceive EOBRs primarily as a means of punishment could undermine the FMCSA's goal of achieving voluntary industrywide acceptance. Therefore, the Safety Board concludes that the only way in which EOBRs can effectively help stem hours-of-service violations, and thereby reduce accidents involving a commercial driver's reduced alertness or fatigue, is for the FMCSA to mandate EOBR installation and use by all operators subject to hours-of-service regulations. Consequently, the Safety Board believes that the FMCSA should require all interstate commercial vehicle carriers to use EOBRs that collect and maintain data concerning driver hours of service in a valid, accurate, and secure manner under all circumstances, including accident conditions, to enable the carriers and their regulators to monitor and assess hours-of-service compliance.

¹⁸ Federal Motor Carrier Safety Administration, NPRM "Electronic On-Board Recorders for Hours-of-Service Compliance," 72(11) *Federal Register* 2340, January 18, 2007 (Washington, DC: National Archives and Records Administration, 2007).

The Safety Board has advocated the industrywide use of on-board recorders to enforce hours-of-service regulations since 1990.¹⁹ In 2000, the FMCSA stated its intent to require industrywide use of EOBRs²⁰ but did not do so in its most recent (January 2007) NPRM addressing this issue. As a result, industrywide adoption of EOBRs for tracking driver hours of service may be delayed by several years. Therefore, until a more effective system for ensuring driver record of duty status is required for all carriers, the FMCSA must strengthen its existing paper log requirements.

During this investigation, the Safety Board discovered two versions of the driver's July 16 log; one version was in the accident vehicle and one was provided by the driver's family. The log found in the vehicle indicated that the driver had driven almost 3 hours longer than the family-provided log indicated.²¹ Both versions were recorded on unbound log paper. Equity stated that, at the request of its drivers, the logs it provides them to record and track their hours of service consist of unbound log sheets. Such a system enables drivers to replace or modify the information recorded without leaving a traceable record of changes. This makes it difficult for inspectors, and the carrier, to determine whether drivers have violated hours-of-service regulations. Federal regulations currently permit a corrected log to be submitted at any time and do not require that the corrected log be marked as such and attached to the original log. Without audit controls, roadside or compliance review inspectors and motor carriers cannot determine whether a driver's log is an original or an altered, revised, or falsified copy.

Requiring that all logs be sequentially numbered and bound, booklet fashion, would assist motor carriers and inspectors in accounting for original log entries. Also, requiring that the motor carrier and driver keep any corrected logs (with an explanation for the corrections) with the original logs would further enhance the integrity of an accounting program. Had Equity combined conscientious driver oversight with a more rigorous accounting of driver logs, the Chelsea accident driver would have been less likely to falsify his logs and continue driving beyond the allowed hours of service. The Safety Board concludes that more accurate paper logs would improve the ability of motor carriers and Government inspectors to audit the hours-of-service records of commercial drivers and to reduce the number of undetected violations of hours-of-service limits. Consequently, the Safety Board believes that the FMCSA should, as an interim measure and until industrywide use of EOBRs is mandated, prevent log tampering and submission of false paper logs by requiring motor carriers to create and maintain audit control systems that include, at a minimum, the retention of all original and corrected paper logs and the use of bound and sequentially numbered logs.

¹⁹ National Transportation Safety Board, *Fatigue, Alcohol, Drugs, and Medical Factors in Fatal-to-the-Driver Heavy Truck Crashes*, Safety Study NTSB/SS-90/01 (Washington, DC: NTSB, 1990).

²⁰ Federal Motor Carrier Safety Administration, NPRM "Hours of Service for Drivers; Driver Rest and Sleep for Safe Operations," 65(85) *Federal Register* 25540, May 2, 2000 (Washington, DC: National Archives and Records Administration, 2000).

²¹ Both of the driver log versions differed significantly from the actual schedule followed by the driver, as reconstructed by investigators using the GPS electronic data. Both paper logs under-represented the time the driver spent on duty.

The National Transportation Safety Board recommends that the Federal Motor Carrier Safety Administration:

Require all interstate commercial vehicle carriers to use electronic on-board recorders that collect and maintain data concerning driver hours of service in a valid, accurate, and secure manner under all circumstances, including accident conditions, to enable the carriers and their regulators to monitor and assess hours-of-service compliance. (H-07-41)

As an interim measure and until industrywide use of electronic on-board recorders is mandated, as recommended in Safety Recommendation H-07-41, prevent log tampering and submission of false paper logs by requiring motor carriers to create and maintain audit control systems that include, at a minimum, the retention of all original and corrected paper logs and the use of bound and sequentially numbered logs. (H-07-42)

The Safety Board also issued a safety recommendation as a result of this investigation to Equity Transportation Company, Inc.

Please refer to Safety Recommendations H-07-41 and -42 in your reply. If you need additional information, you may call (202) 314-6177.

Chairman ROSENKER, Vice Chairman SUMWALT, and Members HERSMAN, HIGGINS, and CHEALANDER concurred in these recommendations.

[Original Signed]

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Chairman