NATIONAL TRANSPORTATION SAFETY BOARD
Public Meeting of March 28, 2017
(Information subject to editing)

Motorcoach Collision With Crash Attenuator in Gore Area, US Highway 101
San Jose, California
January 19, 2016
NTSB/HAR-17-01

This is a synopsis from the NTSB's report and does not include the Board's rationale for the conclusions, probable cause, and safety recommendations. NTSB staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing to reflect changes adopted during the Board meeting.

Executive Summary

On January 19, 2016, about 6:37 a.m., a 2014 Motor Coach Industries International, Inc., D4505 motorcoach, operated by Greyhound Lines, Inc., and occupied by a driver and 21 passengers, was traveling north on US Highway 101 (US-101), in San Jose, California. The weather conditions were dark, with moderate-to-heavy rain and reported winds from the east–southeast at 20 mph.

At the US-101 and State Route 85 (SR-85) interchange, the bus moved to the left and entered a 990-foot-long unmarked gore area. The gore separates the US-101 lanes from the left exit high-occupancy-vehicle lane for SR-85. A crash attenuator with missing retroreflective object marker was positioned at the end of the gore in advance of a concrete barrier. The bus driver maintained the vehicle's path through the gore and collided with the crash attenuator and the concrete barrier.

Following the impact, the bus traveled another 65 feet, rolled 90 degrees, and came to rest on its right side atop the concrete barrier, straddling two lanes of traffic. As a result of the crash, two passengers were ejected and died, and the driver and 13 passengers were injured.

The crash investigation focused on the following safety issues:

- ***Highway:*** The California Department of Transportation (Caltrans) did not complete a repair to the damaged crash attenuator, which led to the bus driver's inability to see the forward hazard. Moreover, the unmarked gore and the out-of-compliance signage provided insufficient traffic guidance.

- ***Managing driver risk:*** Although Greyhound had advanced means of monitoring driver performance, it had no appropriate structure in place to obtain the full benefits of those systems. Furthermore, due to a deficient record-keeping system and correspondingly limited oversight of repeat safety infractions, Greyhound was not adequately managing driver risk.

- ***Occupant protection:*** The bus was equipped with passenger lap/shoulder belts in all seating positions, but only two passengers wore the restraints. Although Greyhound has developed a pretrip safety briefing script that includes information about using seat belts, the carrier only recommends that drivers provide the briefing to passengers. Moreover, California's seat belt use laws do not apply to motorcoach passengers—either through primary or secondary enforcement.

- ***Collision avoidance systems:*** A collision avoidance system could have detected the crash attenuator and alerted the driver to the hazard. The bus involved in this crash was not equipped with such a system.

Findings

1. None of the following were primary or contributory factors in the crash: (1) driver licensing or experience; (2) driver distraction, substance impairment, or medical conditions; or (3) mechanical condition of the bus.

2. The emergency response to this crash was timely and effective.

3. Darkness and precipitation restricted the bus driver's forward visibility.

4. Under the environmental conditions at the time of the crash, the crash attenuator without the retroreflective object marker on the lead cylinder could not have been perceived by the bus driver in time to avoid the crash.

5. The bus driver may have had an inaccurate expectation of the State Route 85 left exit configuration.

6. Despite deviating from Greyhound policies and possibly having an inaccurate expectation of the left exit configuration, the bus driver would not likely have followed an incorrect travel path had the crash attenuator included the retroreflective object marker.

7. An inadequate work order tracking system contributed to the California Department of Transportation not completing the necessary repairs to the crash attenuator.

8. Had the California Department of Transportation used an order tracking system that showed the progress of work orders and provided reminders for those that were overdue, it would have been less likely to neglect to complete the repair of the crash attenuator.

9. Had the sign for the left exit high-occupancy-vehicle lane for State Route 85 been in compliance with the *Manual on Uniform Traffic Control Devices for Streets and Highways*,

it would have provided the bus driver with improved traffic guidance and may have prevented the crash.

10. The Federal Highway Administration has a vital role in ensuring that the California Department of Transportation expedite its compliance with the requirements of the *Manual on Uniform Traffic Control Devices for Streets and Highways*.

11. The absence of optional pavement markings in the neutral area of the gore—in combination with the nonretroreflective crash attenuator—contributed to inadequate traffic guidance, which led to the bus driver's error in not following the correct path onto the left exit high-occupancy-vehicle lane.

12. The inadequate maintenance and limited usability of Greyhound's paper-based record-keeping system resulted in the loss of documentation, made it difficult for terminal managers to easily access and evaluate driver performance, and prevented corporate safety officials from providing timely and adequate oversight.

13. Although Greyhound had a proactive means of monitoring the unsafe behavior of its drivers, it had no clear policy regarding repeat infractions that provided specific steps to remediate the behavior or to justify termination.

14. Had the lap/shoulder belts been properly worn by the bus passengers, they would have kept the occupants in their seats, prevented ejections, and reduced the risk of fatal and serious injuries.

15. The lap/shoulder belts were effective in preventing injuries to those bus passengers who wore them.

16. Greyhound maintenance and pretrip vehicle inspection procedures were incomplete with regard to passenger seat belts.

17. A pretrip safety briefing on the availability and benefits of restraint systems may have increased the likelihood of more passengers using the seat belts.

18. The primary enforcement of mandatory seat belt use laws for all vehicles, in conjunction with pretrip safety briefings, could increase the rate of seat belt use in buses.

19. The benefits of regular maintenance and inspection of seat belts, as well as pretrip briefings, apply across the passenger-carrying fleet.

20. Had the bus been equipped with a collision avoidance system technology, it could have alerted the driver of the forward hazard in time to mitigate the severity of the crash.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the San Jose, California, crash was the failure of the California Department of Transportation to properly delineate the crash attenuator and the gore area, which would have provided improved traffic guidance. Contributing to the crash were the bus driver's error in entering the gore and the out-of-compliance signage, which affected traffic guidance. Contributing to the severity of the injuries was the lack of passenger seat belt use.

RECOMMENDATIONS

New Recommendations

As a result of its investigation, the National Transportation Safety Board makes the following new safety recommendations:

To the Federal Highway Administration:

1. Assist the California Department of Transportation in complying with the *Manual on Uniform Traffic Control Devices for Streets and Highways* requirement pertaining to plaques for left exit signs. (H-17-XX)

2. Revise the *Manual on Uniform Traffic Control Devices for Streets and Highways* to change the delineation of left exit gores, such as by using chevrons or diagonal cross-hatching, from an optional to, at minimum, a recommended guidance practice. (H-17-XX)

To the California Department of Transportation:

3. Modify your work order tracking system to show completion status and to include a means of providing reminders when work orders, particularly those for proprietary devices, are overdue or incomplete. (H-17-XX)

4. Add the left exit plaque to the left exit sign at the crash location and to all left exit guide signs on California highways, as required by the Federal Highway Administration. (H-17-XX)

5. Delineate the neutral area of the gore at the crash site using the best traffic guidance practices, such as chevrons or diagonal cross-hatching. (H-17-XX)

6. Revise the California *Manual on Uniform Traffic Control Devices for Streets and Highways* to change the delineation of left exit gores, such as by using chevrons or diagonal cross-hatching, from an optional to, at minimum, a recommended guidance practice. (H-17-XX)

To the American Bus Association and the United Motorcoach Association:

7. Encourage member passenger-carrying companies to (1) establish procedures to ensure that the seat belts on all buses are regularly inspected to maintain their functionality and accessibility, and (2) provide pretrip safety briefings emphasizing the benefits of seat belt use. (H-17-xx)

To Greyhound Lines, Inc.:

8. Create a personnel file management system that, at minimum, (1) allows for driver records to be accessed by terminal and corporate officials; and (2) includes provisions and safeguards to ensure accuracy, security, backup, and proper maintenance. (H-17-XX)

9. Use industry best practices to establish a policy to more adequately address recurring unsafe driver behavior, to include effective remediation of behavior and establishment of suspension thresholds for termination. (H-17-XX)

10. Establish procedures to ensure that the seat belts on all buses are regularly inspected to maintain their functionality and accessibility. (H-17-XX)

11. Provide pretrip safety briefings at all stops prior to departure when taking on new passengers, which describe the use of the emergency exits and the benefits of wearing seat belts. (H-17-XX)

Reiterated Recommendations

The National Transportation Safety Board also reiterates the following safety recommendations:

To the Federal Motor Carrier Safety Administration:

Require all passenger motor carrier operators to (1) provide passengers with pretrip safety information that includes, at a minimum, a demonstration of the location of all exits, explains how to operate the exits in an emergency, and emphasizes the importance of wearing seat belts, if available; and (2) also place printed instructions in readily accessible locations for each passenger to help reinforce exit operation and seat belt usage. (H-15-14)

To the National Highway Traffic Safety Administration:

Complete, as soon as possible, the development and application of performance standards and protocols for the assessment of forward collision avoidance systems in commercial vehicles. (H-15-5)

To the state of California:

Enact legislation that provides for primary enforcement of a mandatory seat belt use law for all vehicle seating positions equipped with a passenger restraint system. (H-15-42)

To Motorcoach Industries International, Inc.:

Install forward collision avoidance systems that include, at a minimum, a forward collision warning component, as standard equipment on all new vehicles. (H-15-8)

Once the National Highway Traffic Safety Administration publishes performance standards for autonomous emergency braking, install systems meeting those standards on all new vehicles. (H-15-9)