Testimony of
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Auto Safety: Existing Mandates and Emerging Issues
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Good afternoon Chairman Rush, Ranking Member Radanovich, and Members of the Subcommittee. My name is Kitty Higgins, and I am a Member of the National Transportation Safety Board. I would like to take this opportunity to thank you and the Members of the Subcommittee for inviting me to testify today on reauthorization of the National Highway Traffic Safety Administration, or NHTSA, and for your continued interest in furthering the safety of our Nation's highways.

As you know, the Safety Board is charged with investigating accidents in all modes of transportation, including highways, determining their probable cause, and with making recommendations as a result of our accident investigations to prevent similar accidents from happening again. Over the years, the Board has done important work in virtually all aspects of highway safety including highway and vehicle design; roadway environment; occupant protection; driver performance; driver training; emergency response; roadway, bridge, and tunnel construction; and oversight by regulatory agencies at the local, state, and Federal levels.

Today, I would like to discuss motorcoach safety and some of the other Safety recommendations that the Safety Board believes will save lives on our highways such as driver education for young drivers. I have included in my written testimony some safety recommendations issued to the FMCSA because their implementation is also required in order to realize the reduction in crashes that we all hope to achieve.

As those who are familiar with the statistics know, intercity motorcoach travel is one of the safest modes of transportation, with approximately 17 bus occupant fatalities in an average year. It is also one of the most popular forms of travel, often transporting students, senior citizens, and tourists who rely on motorcoach travel and who choose to entrust their safety to the hands of a professional motorcoach driver. As with other modes of commercial transportation, consumers of these services expect that motorcoaches meet high standards for public safety.

However, when an accident does occur, it invariably involves a substantial number of people traveling in a single, multi-occupant vehicle. These high-visibility accidents attract the public's attention and can undermine its confidence in motorcoach travel. When this occurs, the public often turns to the Safety Board for answers because our independent investigations will

ultimately determine the root or probable cause of the accident, and we will attempt to make well-reasoned recommendations to prevent similar occurrences in the future. This process of open, independent, transparent investigations, along with thoughtful, comprehensive, recommendations to prevent future accidents, often restores the public's confidence.

My discussion today will include two areas where NHTSA could improve motorcoach safety; 1) vehicle improvements and 2) technological improvements. I would then like to spend some time discussing another important issue where NHTSA's help is needed -- driver education for young drivers. Finally, I will highlight some of the oversight improvements where we believe that the Federal Motor Carrier Safety Administration or FMCSA could improve motorcoach safety.

Motorcoach Vehicle Improvements

For decades, the Safety Board has been concerned with the cause of injuries in motorcoach accidents. These concerns have prompted the Safety Board to focus on areas such as motorcoach passenger protection and motorcoach fire protection. More generally, we have sought to advance the science of motorcoach safety through the use of event data recorders to help Safety Board investigators better analyze accident dynamics.

Motorcoach Passenger Protection

One of the primary causes of passenger injury in motorcoach accidents is the blunt force trauma that occurs when passengers are thrown from their seats. It is well known that the overall injury risk to occupants in any vehicle can be significantly reduced during an accident by keeping occupants in the seating compartment throughout the collision sequence. Even more devastating are the impact forces that come into play should an occupant be ejected from a motorcoach during the accident sequence. The Safety Board has found that equipping motorcoach side windows with advanced glazing and enhancing the roof strength of these vehicles may decrease the number of ejections of unrestrained passengers.

The Federal Motor Vehicle Safety Standards (FMVSS) contain 22 crashworthiness standards. However, motorcoaches are presently exempt from most of these standards, and no Federal regulations require that motorcoaches in the United States be equipped with any occupant protection system. Although motorcoaches must comply with both FMVSS 217, which establishes minimum requirements for motorcoach window retention and release, and with FMVSS 302, which establish standards for the flammability of interior materials, they do not have to comply with the substantial majority of other FMVSS occupant protection standards that apply to school buses and passenger cars.

It is a fundamental design principle of a well-designed motor vehicle that the vehicle itself should absorb much of the energy of a crash through its structure and thereby minimize the energy transferred to passengers. An effective occupant protection system functions to restrain the passengers within the seating compartment throughout the accident sequence and limit energy transfer from structural components of the vehicle, thereby lessening the risk of injury. One example of such a system that has been studied, tested, and required in school buses is

compartmentalization, but that system has significant limitations during side impact and rollover accident scenarios.

The Safety Board has been making recommendations on motorcoach occupant protection since 1968. In 1999, the Safety Board published a special investigation report on Bus Crashworthiness Issues that addressed motorcoach occupant protection. The recommendations from that study included the following ones to NHTSA:

- In 2 years, develop performance standards for motorcoach occupant protection systems that account for frontal impact collisions, side impact collisions, and rollovers. (H-99-47) This recommendation was added to the Most Wanted list in 2000 and reiterated in the 2001 New Orleans, Louisiana, report and the 2008 Atlanta, Georgia, report.

- Once pertinent standards have been developed for motorcoach occupant protection systems, require newly manufactured motorcoaches to have an occupant crash protection system that meets the newly developed performance standards and restrains passengers, including those in child safety restraint systems, within the seating compartment throughout the accident sequence for all accident scenarios. (H-99-48) This recommendation was reiterated in the 2001 New Orleans report and the 2008 Atlanta report.

- Expand your research on current advanced glazing to include its applicability to motorcoach occupant ejection prevention, and revise window-glazing requirements for newly manufactured motorcoaches based on the results of this research. (H-99-49)

NHTSA's initial response to these recommendations indicated that work had begun to develop a research plan to accomplish these recommendations. Two years later, NHTSA reported forming the Bus Manufacturer's Council and in 2002, the agency held a public forum on motorcoach safety with Transport Canada. In 2004, the Safety Board was informed that NHTSA was focusing on roof crush and window retention technology to keep occupants in the vehicle and had initiated a joint study with Transport Canada.

Since 1998 the Board has investigated 33 motorcoach frontal and rollover accidents (see attached). In these accidents, there were 255 full or partial ejections and 123 fatalities. These rollover crashes clearly demonstrated that passengers who remain in their seating compartments sustain fewer injuries and that ejected passengers are the most likely to be killed.

Unfortunately today, a decade after the Safety Board concluded its Bus Crashworthiness Issues special investigation report, no Federal regulations or standards yet exist that would require motorcoaches be equipped with occupant protection systems. As a result, the Board continues to see many of the same occupant protection problems previously noted in 1999 report. In its 2003 report on a motorcoach collision in Loraine, Texas, then again in its 2004 report on a Motorcoach rollover in Victor, New York, and then again in its motorcoach collision accident in Hewitt, Texas in 2005 the Safety Board identified occupant protection deficiencies that greatly contributed to loss of life and severe injuries. In these 3 accidents alone, a total of 13 passengers were killed and 99 were injured. The Board again reiterated its motorcoach occupant protection recommendations last year in the Board's report on the Bluffton University baseball team

accident in Atlanta, where a lack of adequate occupant protection system was specifically cited in the probable cause as a contributing factor exacerbating the severity of the accident.

The Bluffton University accident in Atlanta, where 12 occupants were ejected, is not the only recent example of passengers being ejected or partially ejected from the motorcoach. Just last month the Board completed another investigation into a motorcoach rollover accident near Mexican Hat, UT where 50 of the 52 passengers were ejected, resulting in 9 fatalities and 44 injuries. (The driver was the only occupant offered a restraint system).

The Board showed its frustration with NHTSA's slow movement on these recommendations in the Mexican Hat report by identifying NHTSA's delay in developing and promulgating standards to enhance motorcoach passenger protection as contributing to the severity of the accident in the probable cause determination. In addition, the Board indicated its frustration with the slow progress being made by reclassifying these unresolved recommendations as having an "unacceptable response" from NHTSA.

However, NHTSA is making some deliberate progress and should be recognized accordingly. In December 2007, NHTSA performed a frontal motorcoach crash test and in February 2008, they performed two tests on motorcoach roof strength and occupant survivable space through the MGA Research Corporation, under contract to NHTSA, both of which were observed by Safety Board staff. The Board will carefully follow the analysis of those test results. In addition, a week after the Board's issuance of the Mexican Hat report, Department of Transportation Secretary Ray LaHood announced that he has ordered a full review of motorcoach safety and will create a Departmental Motorcoach Safety Action Plan which he is directing be completed in August of this year.

Passenger Egress:

Another critical aspect of surviving a motorcoach accident is the ability of all passengers to exit the vehicle in a timely manner. In the Safety Board's 1999 special investigation report on Selective Motorcoach Issues, we found that the emergency window exits need to be easily opened and that they need to remain open during an emergency evacuation. Consequently, the Board recommended that NHTSA:

- Revise the Federal Motor Vehicle Safety Standard 217, "Bus Window Retention and Release," to require that other than floor-level emergency exits be easily opened and remain open during an emergency evacuation when a motorcoach is upright or at unusual attitudes (H-99-9). This recommendation was added to the Most Wanted list in 2000.

- Require motorcoach operators to provide passengers with pre-trip safety information (H-99-8).

The Board's 2000 report following a motorcoach accident near Burnt Cabins, Pennsylvania, where the driver and 6 passengers died asked NHTSA to:

- Revise the federal motor vehicle safety standards to require that all motorcoaches be equipped with emergency lighting fixtures that are outfitted with a self-contained independent power source. (H-00-01)

- Revise the federal motor vehicle safety standards to require the use of interior luminescent, or exterior retroreflective material, or both, to mark all emergency exits in all motorcoaches. (H-00-002)

Passenger egress is even more important during a fire as the Board found in its 2007 report on the motorcoach fire near Wilmer, Texas where 23 occupants died. These were elderly nursing home patients who were being evacuated by motorcoach from Houston in advance of Hurricane Rita. As a result of its investigation, the Safety Board made recommendations to NHTSA to:

- Evaluate current emergency evacuation designs of motorcoaches and buses by conducting simulation studies and evacuation drills that take into account, at a minimum, acceptable egress times for various post-accident environments, including fire and smoke; unavailable exit situations; and the current above-ground height and design of window exits to be used in emergencies by all potential vehicle occupants (H-07-08).

Roof Strength:

Motorcoaches must be strong enough to retain adequate survivable space for passengers during typical accident scenarios, and in the opinion of the Safety Board, this includes rollover sequences. Therefore, the Board's recommendation to NHTSA in our 1999 Bus Crashworthiness report was to:

- Develop performance standards within two years for motorcoach roof strength that provide maximum survival space for all seating positions and that take into account current typical motorcoach window dimensions (H-99-50). This recommendation was added to the Most Wanted list in 2000, reiterated in the 2001 New Orleans report and reclassified as "unacceptable response" in the 2009 Mexican Hat report.

- Once performance standards have been developed for motorcoach roof strength, require newly manufactured motorcoaches to meet those standards (H-99-51). This recommendation was, reiterated in the 2001 New Orleans, LA report and reclassified as "unacceptable response" in the 2009 Mexican Hat, UT report.

Commendably, some limited progress has been made on these recommendations. In 2002, NHTSA met separately with motorcoach manufacturers and operators to address the issue of bus window retention and release; however, no research plan was agreed upon at those meetings. In the fall of 2004, NHTSA signed a Memorandum of Understanding with Transport Canada to carry out research in the areas of roof crush and window retention technology, with a goal of keeping occupants in the vehicle, because most motorcoach fatalities occur when passengers are ejected from the vehicle. NHTSA's research also shows that in most accidents, the bus only rolls ¼ turn and comes to rest on its side; therefore, installation of roof exits to serve as an alternate to window exits as a means of rapid emergency egress for bus passengers is also being examined.

On August 6, 2007, NHTSA issued their "Approach to Motorcoach Safety," which is a comprehensive review of motorcoach safety issues and the course of action that NHTSA will pursue to address them. NHTSA has indicated that it will study its own regulations (such as

FMVSS 217) which establish minimum requirements for bus window retention and release to reduce the likelihood of passenger ejection in crashes—as well as international standards to determine the best way to proceed with the establishment of new requirements to better protect motorcoach passengers.

Motorcoach Fire Protection

On September 23, 2005, a fire engulfed a motorcoach carrying elderly evacuees away from the predicted path of Hurricane Rita near Dallas, Texas—the Safety Board refers to this as the Wilmer, Texas, motorcoach accident. The 44 passengers on board were from an assisted-living facility in Bellaire, Texas, near Houston; many needed to be carried or assisted onto the motorcoach by firefighters or nursing staff, and the loading required almost 2 hours to complete. When the fire occurred, 23 elderly passengers perished because they were unable to escape the blaze, and staff and rescuers could not evacuate them in time. I would like to note that this accident involved very unusual circumstances, and many of the decisions to evacuate and the means incorporated to evacuate were made in the context of the devastation in New Orleans caused by Hurricane Katrina that occurred just one month earlier.

Fortunately, to date, injuries and fatalities related to motorcoach fires have been an extremely rare event. However, fires on motorcoaches are not unusual occurrences. In fact, some industry experts estimate that there is approximately one motorcoach fire per day. Still, this accident shows the potential for catastrophe when passengers are unable to exit a burning motorcoach quickly.

As a result of its investigation, the Board asked NHTSA to:

- Develop a Federal Motor Vehicle Safety Standard to provide enhanced fire protection of the fuel system in areas of motorcoaches and buses where the system may be exposed to the effects of a fire. (H-07-04) In the interim, while standards are being developed, we asked the motorcoach manufacturers to use currently available materials and designs for fuel system components that are known to provide fire protection for the system.

- Develop a Federal Motor Vehicle Safety Standard to provide fire-hardening of exterior fire-prone materials, such as those in areas around wheel wells, to limit the potential for flame to spread into a motorcoach or bus passenger compartment. (H-07-05)

- Since wheel well fires are so difficult to extinguish, we asked NHTSA to develop detection systems to monitor the temperature of wheel well compartments in motorcoaches and buses to provide early warning of malfunctions that could lead to fires so that passengers might have time to escape. (H-07-06)

- Evaluate the need for a Federal Motor Vehicle Safety Standard that would require installation of fire detection and suppression systems on motorcoaches. (H-07-07)

In addition, the Safety Board asked the FMCSA to:

- Establish a process to continuously gather and evaluate information on the causes, frequency, and severity of bus and motorcoach fires, and conduct ongoing analysis of the fire data to measure the effectiveness of the fire prevention and mitigation techniques identified and instituted as a result of the Volpe National Transportation Systems Center fire safety analysis study. (H-07-1)

- Revise the Federal Motor Carrier Safety Regulations to prohibit a commercial vehicle from operating with wheel seal or other hub lubrication leaks. (H-07-02)

Event Data Recorders

Since motorcoach accidents are relatively rare events and motorcoach crash testing is prohibitively expensive, one way to efficiently collect crash data, evaluate crash pulses, and occupant protection issues is to equip motorcoaches with event data recorders (EDR). An event data recorder is a device similar to a "black box" on aircraft that records a vehicle's dynamic, time-series data just before a crash (vehicle speed versus time) or during a crash (change in velocity versus time). Intended for retrieval after the crash event, EDR data can provide critical safety system performance information. To enhance crash testing with real-world data, it is important that data from motorcoach crashes be used for post-accident analysis, forensics, and design evaluation. At an SAE International symposium on highway EDRs, industry representatives presented the status of efforts to develop EDR standards, current system operating experience, and evidence that many operators currently use vehicle data recorders to improve operational control, to support insurance rates and claims, and to respond to litigation. The Board would like to see these devices on all motorcoaches for the purposes of accident investigation.

Although crash forces can sometimes be estimated by comparing the accident vehicle's physical damage to instrumented crash test data, this method is not always reliable, particularly when crash test data are extremely limited as they are for motorcoaches, and when the accident involves a barrier collision or a collision with a hard paved surface. The ability to estimate crash pulses is also limited by the fact that some surfaces of the motorcoach may have undergone multiple collisions.

As a result of its 1996 Safety Study on Child Restraint Systems and subsequent 1997 Air Bag Forum, the Safety Board recommended that NHTSA address the on-board recording of crash data. About that time, the National Aeronautics and Space Administration and the Jet Propulsion Laboratory also recommended that NHTSA study the feasibility of obtaining crash data for safety analysis by installing crash recorders on vehicles. In response, NHTSA organized the EDR Working Group in October 1998. In 1999, the Safety Board held a Symposium on Transportation Recorders. Later that year, as a result of its Special Investigation on Bus Crashworthiness, the Safety Board made the following two EDR-related recommendations to NHTSA:

- Require that all school buses and motorcoaches manufactured after January 1, 2003, be equipped with on-board recording systems that record vehicle parameters, including, at minimum, lateral acceleration, longitudinal acceleration, vertical acceleration, heading, vehicle speed, engine speed, driver's seat belt status, braking input, steering input, gear selection, turn signal status (left/right), brake light status (on/off), head/tail light status

(on/off), passenger door status (open/closed), emergency door status (open/closed), hazard light status (on/off), brake system status (normal/warning), and flashing red light status (on/off) (school buses only). For those buses so equipped, the following should also be recorded: status of additional seat belts, airbag deployment criteria, airbag deployment time, and airbag deployment energy. The on-board recording system should record data at a sampling rate that is sufficient to define vehicle dynamics and should be capable of preserving data in the event of a vehicle crash or an electrical power loss. In addition, the on-board recording system should be mounted to the bus body, not the chassis, to ensure that the data necessary for defining bus body motion are recorded. (H-99-53) (Reiterated in the 2008 Atlanta, Georgia report.)

- Develop and implement, in cooperation with other government agencies and industry, standards for on-board recording of bus crash data that address, at a minimum, parameters to be recorded, data sampling rates, duration of recording, interface configurations, data storage format, incorporation of fleet management tools, fluid immersion survivability, impact shock survivability, crush and penetration survivability, fire survivability, independent power supply, and ability to accommodate future requirements and technological advances. (H-99-54) (Reiterated in the 2008 Atlanta, Georgia report.)

In October 2000, NHTSA organized the Truck and Bus Event Data Recorder Working Group to focus on data elements, survivability, and event definitions related to trucks, school buses, and motorcoaches. The group's results and findings were published in May 2002. In 2004, the NCHRP completed a project that examined current U.S. and international methods and practices for the collection, retrieval, archiving, and analysis of EDR data for roadside and vehicle safety. Both the IEEE and SAE have published voluntary industry motor vehicle EDR standards. A second SAE standards committee, J2728 -- Commercial Vehicle Event Data Recorders -- is specifically addressing data elements for medium- and heavy-duty trucks. Industry initiatives in standards development include the American Trucking Association's Technology and Maintenance Council's publication of a recommended practice to define the collection of event-related data collected on commercial vehicles. The recommended practice outlines data elements, storage methodology, and the retrieval approach for event data recordings on commercial vehicles.

In the meantime, FMCSA's "Commercial Vehicle Safety Technology Diagnostics and Performance Enhancement Program" (also known as the "CV Sensor Study") has worked to define driver and vehicle assistance products and systems and, in particular, advanced sensor and signal processors in trucks and tractor-trailers, with an emphasis on on-board diagnostic and improved safety-related products. The program involves developing EDR requirements for the analysis of accident data from the FMCSA's Large Truck Crash Causation Study, with the goal of developing EDR functional specifications for both complete accident reconstruction and crash analyses. To date, this project has developed requirements for EDR components, hardware, software, sensors, and databases and has completed a cost-effectiveness analysis.

In recent years, NHTSA has made progress in developing EDR data standards for light vehicles, which include passenger cars, multipurpose passenger vehicles, light trucks, and vans with a gross vehicle weight rating of 8,500 pounds or less. In August 2006, NHTSA published a final rule that standardizes the information EDRs collect, but it was amended in January 14,

2008, in response to numerous petitions for reconsideration. Based on this revised rule, compliance dates have been changed to September 1, 2012, for most light vehicles and to September 1, 2013, for vehicles manufactured in two or more stages. The new rule, however, does not address vehicles over 8,500 pounds and thus, would not apply to buses or motorcoaches.

In its August 2007 "Approach to Motorcoach Safety," NHTSA included a discussion of EDRs, stating that the agency has recently defined mandatory data elements for the voluntary installation of EDRs in light passenger vehicles. However, crash characteristics and relevant measurements for motorcoaches are different, as supported by the 2001 NHTSA EDR Working Group final report's "Summary of Findings."

The EDR Working Group's final report also noted the following:

- EDRs can improve highway safety for all vehicle classes by providing more accurate data for accident reconstructions, and

- U.S. and European studies have shown that the number and severity of crashes is reduced when drivers know that an on-board EDR is in operation.

Unfortunately, NHTSA's "Approach to Motorcoach Safety" also makes the seemingly contradictory statement that Safety Recommendations H-99-53 and -54 concerning EDRs do not specifically relate to changes that would have a direct or quantifiable safety benefit for motorcoach occupants. The Safety Board believes the lack of useful event data associated with accident motorcoaches represents a missed opportunity to better understand crash forces, ejection dynamics, and crashworthiness. Event data recorders would provide the accurate and detailed event data necessary to better understand crash causation and to establish design requirements for motorcoach crashworthiness and occupant protection systems.

The need for such information is particularly significant as EDRs become more widely used in the truck and transit industry, as evidenced at the September 2007 EDR symposium sponsored by SAE. During the symposium, representatives from industry noted that EDR applications are being more widely used for motor carrier analysis of accidents and to support more accurate insurance underwriting and risk analysis. A hopeful indication was also contained in NHTSA's "Approach to Motorcoach Safety," where NHTSA states "Upon completion of SAE J2728, consideration of a requirement for heavy vehicle EDR installation into motorcoaches would be appropriate."

The Safety Board applauds NHTSA's progress in developing EDR standards for light vehicles. However, establishing EDR performance standards for motorcoaches and buses is critical for the timely and efficient implementation of EDRs, which will provide the data needed to develop effective occupant protection systems. The Board urges NHTSA to actively push to complete standards work and require EDRs on all new motorcoaches.

Technology Improvements

The Safety Board believes that developing and installing new technologies can substantially reduce certain kinds of common accident scenarios. Those technologies include collision warning systems, adaptive cruise control, and electronic stability control combined with active braking.

For example, the Safety Board applauds NHTSA's action in requiring ESC on all new cars and light trucks sold in the U.S. by September 1, 2011. This issue was highlighted in the Board's investigation of a 5-fatal accident in Largo, Maryland, involving an inexperienced driver. The Board 2003 report on this accident made recommendations to NHTSA to:

- Expand its current evaluation of electronic stability control systems and determine their potential for assisting drivers in maintaining control of passenger cars, light trucks, sport utility vehicles, and vans. Included in this evaluation was an accident data analysis of electronic stability control-equipped vehicles in the U.S. fleet. (H-03-06)

Unfortunately, this rule only applies to passenger cars, multipurpose vehicles, trucks, and buses with a gross vehicle weight rating of 10,000 pounds or less. Below are some descriptions of areas where the Board hopes NHTSA will soon make similar progress for commercial vehicles.

Collision Warning Systems (CWS) and Adaptive Cruise Control (ACC)

In 1995, the Board first made recommendations concerning collision-warning systems as part of its Special Investigation of Collision Warning Technology. The following recommendation was made to both the DOT and to the Intelligent Transportation Society of America:

- In cooperation with the Intelligent Transportation Society of America, sponsor fleet testing of collision warning technology through partnership projects with the commercial carrier industry. Incorporate testing results into demonstration and training programs to educate the potential end-users of the systems. (H-95-44)

In 1999, the Safety Board held a public hearing on Advanced Safety Technologies for Commercial Vehicle Applications to discuss and highlight new and emerging technologies such as collision warning systems among others.

In 2001 the Safety Board published its report entitled Vehicle- and Infrastructure-based Technology for the Prevention of Rear-End Collisions in which it showed that developing and installing new technologies, such as adaptive cruise control and collision warning systems in commercial trucks, buses, and passenger vehicles, would substantially reduce accidents. This assessment came from numerous Board investigations including 9 rear-end collisions investigated over a 2-year period in which 20 people died and 181 were injured. Three of the accidents involved buses and one accident involved a total of 24 vehicles. Common to all nine accidents was the rear-following vehicle driver's degraded perception of traffic conditions ahead before striking other vehicles. Our investigation of these accidents did not identify the use of drugs, alcohol, or vehicle mechanical defects. The investigations showed that sun glare, fog, smoke, fatigue, distractions, and work zones often interfered with a driver's ability to detect slow-moving or stopped traffic ahead and resulted in rear-end collisions. According to the DOT,

preliminary analyses have shown that 1,836,000 police-reported crashes, or about 48 percent of accidents, could be prevented by rear-end or run-off-the-road and lane change collision warning systems (CWS). As part of this report, the Board issued the following recommendation to NHTSA in 2001:

- Complete rulemaking on adaptive cruise control and collision warning system performance standards for new commercial vehicles. At a minimum, these standards should address obstacle detection distance, timing of alerts, and human factors guidelines, such as the mode and type of warning. (H-01-6)

In 2006 this recommendation was reiterated in the Board's report involving a rear end collision at a toll plaza near Hampshire, Illinois.

In 2007 this recommendation was added to the Board's Most Wanted list.

In 2008 this recommendation was again reiterated in the Board's report involving a nighttime motorcoach collision with an overturned tractor-trailer near Osseo, Wisconsin, and a tractor-trailer that rear-ended a sedan and school bus near Lake Butler, Florida.

In 2001, as a major component of the Intelligent Transportation System (ITS) program, the DOT established an Intelligent Vehicle Initiative (IVI)—the goal of which was to improve the safety and efficiency of motor vehicle operations by reducing the probability of motor vehicle crashes. As part of the IVI, NHTSA evaluated the performance of CWS and adaptive cruise control (ACC) by participating in field operational tests of vehicles equipped with advanced safety systems. In May 2005, NHTSA released the results of its passenger vehicle testing, Automotive Collision Avoidance System Field Operational Test Final Program Report, showing potential to reduce rear-end crashes by 10 percent and reporting positive user reaction to the systems. The final report on the commercial vehicle field-testing conducted for the DOT by Battelle and Volvo Trucks North America, Inc., was released in January 2007. The preliminary findings of the report indicate that a combined CWS and ACC bundled safety system account for a statistically significant reduction in rear-end crashes through reduced exposure to safety-critical driving scenarios.

NHTSA, along with FHWA, FMCSA, and RITA, appear to be working consistently on this important technological safety issue. The preliminary results of the testing on advanced safety systems are encouraging, but rulemaking is needed to ensure uniformity of system performance standards, such as obstacle detection, timing of alerts, and human factors guidelines, on new passenger and commercial vehicles.

Electronic Stability Control and Active Braking

The Safety Board has also made recommendations on electronic stability control and active braking to improve a vehicle's handling, particularly at the limits where the driver might lose control of the vehicle. In concert with ABS brakes, ESC senses when a vehicle is about to slide or yaw, and applies brakes to the proper wheels to regain control. Active braking takes CWS one step further by automatically applying the brakes when a driver does not react and a collision is imminent. These two technologies are related in that ESC can help a driver maintain control of the vehicle when active braking is used.

The Board first made recommendations on electronic stability control back when it was called “traction control” following a 1997 accident in Slinger, Wisconsin, involving commercial vehicles operating under icy conditions. Eight fatalities occurred when a truck lost control, crossed a median and struck a van. In its report, the Board made the following recommendations to NHTSA:

- Work, together with FHWA, the American Trucking Associations, the International Brotherhood of Teamsters, and the Motor Freight Carrier Association to conduct laboratory and truck fleet testing to assess the safety benefits of adding traction control devices to antilock brake systems and report your findings to the NTSB. (H-98-015)

- Work, together with the FHWA, the American Trucking Association, the International Brotherhood of Teamsters, and the Motor Freight Carrier Association to encourage the trucking industry to gain experience with traction control devices through fleet tests. (H-98-016)

In addition, as part of its 2008 report on the motorcoach accident in Osseo, Wisconsin, Lake Butler, Florida, and Turrell, Arkansas, the Board made the following recommendation to NHTSA:

- Determine whether equipping commercial vehicles with collision warning systems with active braking and electronic stability control systems will reduce commercial vehicle accidents. If these technologies are determined to be effective in reducing accidents, require their use on commercial vehicles. (H-08-15)

The Safety Board believes that new technologies like the ones mentioned here as well as others hold great promise is reducing accidents, especially when drivers are distracted or in bad weather.

Driver Education

Stepping back from motorcoach issues for moment, there is another area I would like to discuss where NHTSA could help improve highway safety, and that area is driver education for our young, developing drivers. As you know, motor vehicle crashes are the leading cause of death for 15- to 20-year-olds, accounting for two out of every five teenage deaths. Drivers between the ages of 15 and 20 represent 6.4 percent of licensed drivers in the United States but were involved in 12.5 percent of fatal crashes and 15 percent of all police-reported crashes in 2007. In that same year, 15- to 20-year-old drivers involved in fatal crashes numbered 6,982.

To understand the role of driver education in novice driver crash rates, the National Transportation Safety Board convened a 2-day public forum in October 2003 to survey the extent to which novice driver education and training is used, its effectiveness and shortcomings, and what can be done to improve it.

As a result of this forum, the Safety Board concluded that although the various approaches to driver education in the United States and Europe may have aspects that provide novice drivers

with some of the training and skills needed to drive safely, no systematic evaluation has been conducted to determine which components are effective in teaching safe driving skills. Consequently, educators and commercial driving schools have little or no reliable guidance to follow in designing an appropriate curriculum or in establishing requirements for classroom or behind-the-wheel instruction. Further, to be effective, novice driver education must take into account research results that offer an understanding of how teenagers learn and of the behavioral environment in which teenagers typically function.

Finally, the standard formula of 30 hours of classroom training followed by 6 hours of behind-the-wheel training was determined arbitrarily and is probably inadequate to teach teenagers the skills necessary to drive safely on today's roadways.

Therefore, the Safety Board recommended in August 2005 that the U.S. Department of Education and the National Highway Traffic Safety Administration:

- Review current driver education and training programs in use nationally and internationally and determine which instructional tools, training methods, and curricula have led or are likely to lead to a reduction in crashes; and, further, that the two agencies work together to incorporate these best practices into a model driver education and training curriculum. (H-05-23 and H-05-25)
- Determine the optimum sequencing of driver education (both in the classroom and behind the wheel) and graduated driver licensing qualifications for educating novice drivers on safe driving skills, and encourage the States to adopt this requirement. (H-05-24 and H-05-26)

Improvements in driver education and ultimately in our young driver habits and skills will pay multiple dividends well into the future.

FMCSA Motorcoach Oversight Improvements

For decades the Board has been concerned with the safety of motorcoach operators and the oversight provided by local, state, and Federal agencies. These areas include:

- Oversight of the Compliance Review Process (vehicle and driver),
- Oversight of Driver Medical Conditions,
- Electronic Onboard Recorders for Hours of Service (fatigue), and
- Cell Phone Use by Bus Drivers.

Oversight of the Compliance Review Process

The Safety Board has a long history of asking FMCSA to focus on vehicles and drivers when they conduct compliance reviews of motor carriers and the motorcoach fire near Wilmer, Texas is an illustration of the potential consequences of poor oversight of motorcoach operations, especially concerning the vehicle. The fire in this accident would not have occurred had the motorcoach been properly maintained.

The Safety Board determined that the cause of the fire was insufficient lubrication in the right-side tag axle wheel bearing assembly of the motorcoach, which resulted in increased temperatures and subsequent failed wheel bearings. The high temperatures resulting from the friction led to the ignition of the tire and a catastrophic fire. This occurred because the motorcoach operator failed to maintain their vehicles and FMCSA failed to provide proper oversight of the motor carrier through its compliance review process. In fact, FMCSA's ineffective compliance review system was identified in the Board's probable cause as contributing to the accident.

Unfortunately, FMCSA is only able to conduct compliance reviews for a small fraction of the almost 911,000 motor carriers in this country. However, in this particular accident, numerous driver and vehicle safety violations were uncovered prior to the accident by both the Texas Department of Public Safety (DPS) in April 2002 and FMCSA in 2004. Unfortunately, at the time, the Texas DPS had no authority to force the motor carrier to cease operations. The February 2004, FMCSA compliance review found similar violations pertaining to drivers and vehicles but still gave the carrier a "satisfactory" rating. When FMCSA conducted a post-accident compliance review in September 2005 it found many of the same violations as in its previous compliance review; however, this time FMCSA rated the carrier "unsatisfactory", declared it an "imminent hazard" to public safety, and shut it down.

Concerned that motor carriers with significant regulatory violations for drivers and vehicles are still receiving satisfactory ratings, the Safety Board once more focused on Federal standards for determining the safety fitness of carriers. As we have done in several accident investigations over the past 10 years, the Board again concluded that the current FMCSA compliance review process does not effectively identify unsafe motor carriers and prevent them from operating, especially when violations are found in the areas of driver and vehicle safety. As a result, in 2007 we reiterated our long-standing recommendation to FMCSA to:

- Change the safety fitness rating methodology so that adverse vehicle or driver performance-based data alone are sufficient to result in an overall unsatisfactory rating for a carrier. (H-99-6)

The Safety Board originally issued this recommendation in 1999 in a Special Study on Selective Motorcoach Issues. It was then added to the Board's Most Wanted list in 2000. We then reiterated the recommendation in 2002 in our Mountainburg, Arkansas, report involving a truck-school bus accident, and reiterated it again in 2007 in the motorcoach fire near Wilmer, Texas.

The Board does not believe FMCSA is doing enough to prevent motor carriers from putting vehicles with mechanical problems on the road and putting unqualified drivers behind the wheel.

By way of background, the Motor Carrier Safety Act of 1984 directed the Department of Transportation to establish a procedure to determine how safely motor carriers operate. Currently, the DOT, through the FMCSA, uses a system for determining how safely a motor carrier operates that does not place sufficient emphasis on driver or vehicle qualifications. Motor carriers are given safety ratings based on compliance reviews conducted by the FMCSA. Carriers are rated on six safety fitness factors:

1. general -- including financial responsibility, insurance coverage, drug and alcohol programs,
2. driver -- including qualifications and training,
3. operations -- including management controls, scheduling practices, allowing violations of rules, false reports, failing to maintain records,
4. vehicle -- including maintenance,
5. hazardous materials -- including failure to follow regulations, and
6. accident rate.

A motor carrier typically receives an unsatisfactory overall rating only if two or more elements are rated unsatisfactory. An overall unsatisfactory rating can lead to a carrier being ordered to cease operations.

The Safety Board's investigations have demonstrated that the two most important factors in safe motor carrier operations are the operational condition of the vehicles and the performance of the drivers who drive them. The Board believes that if the carrier receives an adverse rating (conditional or unsatisfactory) for either the vehicle or driver factor, then the overall rating should be unsatisfactory.

In 2007, the FMCSA briefed the Safety Board on their "Comprehensive Safety Analysis (CSA) 2010 Initiative" which they indicated would include a complete evaluation of the compliance review process leading to the development of a new performance-based operational model for determining motor carrier safety, emphasizing preventative measures and early detection for unsafe driver and carrier conditions. Under CSA 2010, the FMCSA plans to decouple the safety fitness rating from the compliance review. They have started the process of developing a new safety fitness rating methodology that would be based on an objective measure of a driver's or carrier's safety performance data. These safety ratings would be issued to all drivers and carriers. FMCSA began pilot testing the new rating system in 2008.

The Safety Board believes FMCSA's current efforts represent a comprehensive review of the process of determining the safety of commercial motor carriers. Still, the Board continues to monitor FMCSA's actions and is concerned that accidents continue to occur involving motor carriers with poor oversight of their drivers and vehicles.

Oversight of Driver Medical Conditions

On Mother's Day 1999 in New Orleans, a commercial driver lost consciousness while driving a motorcoach on an interstate highway, left the roadway, and crashed into an embankment, killing 22 passengers, and injuring 21 others. The driver was found to have had multiple known serious medical conditions, including kidney failure and congestive heart failure, and was receiving intravenous therapy for 3-4 hours a day, 6 days a week.

The Safety Board has investigated many other accidents involving commercial drivers with serious preexisting medical conditions that had not been adequately evaluated. These include:

- a nearly blind school bus driver in Buffalo, Montana, who apparently did not see an oncoming train that struck the bus and killed 2 students;

- a New York City transit bus driver with a seizure history who experienced a seizure while driving the bus, seriously injuring a cyclist and killing a pedestrian;

- a tractor-trailer driver with unevaluated sleep apnea and untreated thyroid disease who ran over and killed a State Trooper driving in his highway patrol vehicle with lights flashing near Jackson, Tennessee; and

- an alcohol-dependent tractor-trailer driver whose excessive speed resulted in a load breaking free and striking a school activity bus in Franklin, North Carolina, killing the school bus driver and a child.

It is unusual in our accident investigations to find a commercial driver for whom there are not some questions regarding medical certification. This is not to say that a driver's medical conditions are always causal to the accident, but finding these undocumented and unevaluated conditions in commercial drivers is of significant concern. In many cases, these conditions are manageable if they are appropriately evaluated, treated, and monitored. Unfortunately, for a variety of reasons, no such evaluation, treatment, or monitoring occurred in many of the cases we investigated.

As a result of observing serious deficiencies in the oversight of commercial driver medical certification in several of our investigations including the New Orleans accident, the Safety Board issued recommendations to the FMCSA in 2001 to develop a comprehensive medical oversight program for interstate commercial drivers. The Board suggested that such a program include qualified and properly educated examiners, updated and available regulatory and non-regulatory guidance, review and tracking of medical exams, improved enforcement of certification requirements, and appropriate mechanisms for reporting unfit drivers. The Board's recommendations specify a comprehensive oversight program, because we feel that only by addressing this issue in a systematic fashion can a truly effective program of oversight be developed. A piecemeal approach to the problem may result in deficiencies that will continue to permit unqualified drivers to operate on the nation's highways. The specific recommendations are as follows:

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program elements: individuals performing medical examinations for drivers are qualified to do so and are educated about occupational issues for drivers. (H-01-17)

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program elements: a tracking mechanism be established that ensures that every prior application by an individual for medical certification is recorded and reviewed. (H-01-18)

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program elements: medical certification regulations are

updated periodically to permit trained examiners to clearly determine whether drivers with common medical conditions should be issued a medical certificate. (H-01-19)

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program elements: individuals performing examinations have specific guidance and a readily identifiable source of information for questions on such examinations. (H-01-20)

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program element: the review process prevents, or identifies and corrects, the inappropriate issuance of medical certification. (H-01-21)

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program element: enforcement authorities can identify invalid medical certification during safety inspections and routine stops. (H-01-22)

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program element: enforcement authorities can prevent an uncertified driver from driving until an appropriate medical examination takes place. (H-01-23)

- develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program elements: mechanisms for reporting medical conditions to the medical certification and reviewing authority and for evaluating these conditions between medical certification exams; individuals, health care providers, and employers are aware of these mechanisms. (H-01-24)

In 2003, because of the critical importance of this issue and the lack of substantive progress on the recommendations, this issue was placed on the Safety Board's Most Wanted list.

On October 3, 2005, FMCSA announced the establishment of a medical review board (MRB) as required by the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The five members of the MRB held their first quarterly public meeting on August 31, 2006, to begin reviewing all current Federal Motor Carrier Safety Regulation (FMCSR) medical standards, in accordance with the Federal Advisory Committee Act. The MRB members also work with research panels to examine medical issues affecting commercial motor vehicle drivers for the development of new science-based standards and guidelines to ensure the physical qualification requirements for commercial operators. Recent and current topics under review by the MRB include vision and hearing, prescription medications, renal disease, and psychiatric disorders.

On December 1, 2008, the FMCSA published a notice of proposed rulemaking (NPRM) to develop a National Registry of Certified Medical Examiners (NRCME), an action also required by SAFETEA-LU. The Safety Board has commented on a number of deficiencies in the NPRM, including its concern with the inclusion of individuals without thorough knowledge of prescription drugs to be certified medical examiners.

The FMCSA also continues to develop an online medical examiner's handbook, the first completed sections of which are now available on the NRCME website. Approximately 6,000 medical examiners have registered to receive informational updates via e-mail. Examiners can also obtain technical assistance through telephone services provided by the FMCSA headquarters office and certain field offices.

On December 1, 2008, the FMCSA issued a final rule to merge information from the medical certificate of commercial drivers into the CDL process. Although the proposed rule will, to a certain extent, address the ability of enforcement authorities to identify invalid medical certification and to prevent uncertified drivers from driving until an appropriate medical examination takes place, the Board commented on a number of deficiencies in the NPRM that were not addressed in the final rule.

In summary, the FMCSA has made limited progress on certain Congressionally mandated issues regarding medical certification of commercial drivers; however, a number of Safety Board concerns remain completely unaddressed, including: the lack of a review system to identify inappropriately issued certificates, the lack of a system by which unfit drivers can be reported between examinations, and the continued authorization of examiners without sufficient training in medication effects.

Electronic Onboard Recorders for Hours of Service (Fatigue)

Paper logbooks offer many opportunities to manipulate hours of service accounting under the hours of service rules. In our investigations, we repeatedly find that some drivers falsify their books or keep two sets of books, and some motor carriers do not closely monitor their drivers' compliance with the rules. Recognizing this lack of accountability with paper logbooks, the Safety Board has advocated the use of on-board data recorders for hours of service for the past 30 years.

In 1977, the Safety Board issued its first recommendation on the use of on-board recording devices for hours of service compliance by asking the FHWA to explore the merits of tachographs on reducing commercial vehicle accidents. Although the FHWA studied the issue, they did not require tachographs.

During the 1980's, the technology for on-board recorders for hours of service improved dramatically and the European community began requiring tachographs and other similar devices. In 1990, as part of a study on heavy truck crashes, the Safety Board recommended that:

- FHWA and the states require the use of automated/tamper-proof on-board recording devices. (H-90-28)

This recommendation was not acted upon by the FHWA. In 1995, the Board reiterated this same recommendation to the FHWA and the states in its safety study on Factors That Affect Fatigue in Heavy Truck Accidents. They uniformly failed to act.

In 1998, following an accident in Slinger, Wisconsin, the Safety Board tried a different approach, and made recommendations directly to industry, asking them to:

- Equip their commercial vehicle fleets with automated and tamper-proof, on-board recording devices. (H-98-23/26)

This recommendation was opposed by the industry.

In 2001, when the FMCSA issued a Notice of Proposed Rulemaking on hours of service of drivers, the Safety Board reiterated its position that FMCSA strongly consider mandatory use of electronic onboard recorders by all motor carriers. FMCSA did not incorporate this suggestion into the NPRM.

In 2004, following an accident Chelsea, Michigan, the Board asked FMCSA to:

- Require all interstate commercial vehicle carriers to use electronic on-board recorders for hours of service. (H-07-41) And as an interim measure, until industry-wide use of recorders is mandated, prevent log tampering by requiring motor carriers to create audit control systems for their paper logs. (H-07-42) These recommendations were added to its Most Wanted List of Safety Improvements in 2008.

Finally, in 2007 the FMCSA issued a proposed rulemaking for on-board recorders; however, there are 2 primary reasons why the Board felt the NPRM fell short of its intended target.

First, the rule does not require EOBRs for hours of service for all commercial vehicles, but rather promotes voluntary installation and only requires installation for pattern violators. The Safety Board is concerned that pattern violators will be very difficult to identify without this technology and is convinced that the only effective way in which on-board recorders can help stem hours of service violations is to mandate their use by all operators.

Second, the Safety Board would like to see damage resistance and data survivability included in the standards for recorder hardware.

In September of 2008 the Board published a report that contained 3 fatigue-related accidents that occurred in Osseo, Wisconsin, Lake Butler, Florida, and Turrell, Arkansas, and encouraged FMCSA to implement H-07-41 as soon as possible. The Board also issued the following new recommendations to FMCSA:

- to develop and implement a plan to deploy technologies in commercial vehicles to reduce the occurrence of fatigue-related accidents (H-08-13), and

- to develop and use a methodology that will continually assess the effectiveness of the fatigue management plans implemented by motor carriers (H-08-14).

Finally, just last month, the Board reiterated recommendation H-07-41 in its report on the motorcoach accident that occurred in Mexican Hat, Utah that was caused by a fatigued driver.

In summary, fatigue-related accidents continue to plague our Nation's highways because, unlike alcohol or drugs, fatigue is extremely difficult to detect. In fact, fatigue is probably the

most underreported causal factor in highway accidents. Electronic on-board recorders for hours of service hold the potential to efficiently and accurately collect and verify the hours of service for all commercial drivers. They will also establish the proper incentives and create a level playing field for compliance with hours of service rules that will ultimately make our highways safer for all drivers.

Cell Phone Use by Bus Drivers

On November 14, 2004, during daylight hours, a 44-year-old bus driver was operating a motorcoach in the southbound right lane of the George Washington Memorial Parkway in Alexandria, Virginia, taking 27 high school students and a chaperone to Mount Vernon. This vehicle was the second bus of a two-bus team. The motorcoach was traveling approximately 46 miles per hour as it approached a stone arched overpass bridge, which passes over the GW Parkway. The bus driver passed warning signs indicating that the right lane had only a 10-foot, 2-inch clearance, while the center lane had a 13-foot 4-inch clearance. The bus was 12 feet tall. The lead bus moved into the center lane, but the accident bus driver remained in the right lane and drove the bus into the underside of the bridge. Witnesses and the bus driver reported he was talking on a hands-free cellular telephone at the time of the accident. Of the 27 student passengers, 10 received minor injuries and 1 sustained serious injuries. The bus's roof was destroyed.

The Safety Board determined that the probable cause of this accident was the bus driver's failure to notice and respond to posted low-clearance warning signs, and to the bridge itself, due to cognitive distraction resulting from conversing on a hands-free cellular telephone while driving.

As a result of this accident, the Safety Board made the following recommendations:

- To FMCSA and the 50 states: Publish regulations (or enact legislation) to prohibit cellular telephone use by commercial driver's license holders with a passenger-carrying or school bus endorsement, while driving under the authority of that endorsement, except in emergencies. (H-06-27/28)

- To the motorcoach associations, school bus organizations, and unions: Develop formal policies prohibiting cellular telephone use by commercial driver's license holders with a passenger-carrying or school bus endorsement, while driving under the authority of that endorsement, except in emergencies. (H-06-29)

- To the 20 states that do not have driver distraction codes on their traffic accident investigation forms: Add driver distraction codes, including codes for interactive wireless communication device use to your traffic accident investigation forms. (H-03-09) This recommendation was originally made in the 2003 5-fatal Largo, MD report and reiterated in the 2006 Alexandria, VA report.

In summary, the Safety Board believes that, although motorcoach travel is one of the safest modes of transportation, and some progress has been made on many of our long-standing recommendations, that there is still much to be done. The Safety Board remains cautiously

hopeful that NHTSA, FMCSA, and other organizations will soon implement changes that address many of the issues discussed today so that we can make a safe mode of transportation even safer.

Mr. Chairman, this completes my statement, and I will be happy to respond to any questions you may have.

Attachments

- Appendix D from the Board's Mexican Hat, UT report adopted 4/21/09 – Motorcoach Accident Investigation Since 1998

- NTSB Most Wanted List of Transportation Safety Improvements

- NTSB Safety Recommendation to "NHTSA on the Most Wanted List

- Mexican Hat, UT Executive Summary

Appendix D (from the Board's 4/21/09 Mexican Hat, UT report)

Safety Board Motorcoach Accident Investigations

The National Transportation Safety Board's 1999 special investigation on bus crashworthiness[1] included statistics on 36 motorcoach accidents investigated by the Safety Board from 1968 through 1997. This appendix summarizes 33 motorcoach frontal crash and rollover accidents investigated by the Board (major accidents, field investigations, and incidents) since 1998. Table D-1 accounts for motorcoach passengers, not drivers, because drivers' use of seat belts decreases the likelihood of ejection.

Table D-1. Motorcoach accidents investigated by the Safety Board since 1998.

	Year	Accident	Passenger Fatalities	Injuries	Ejections	Crash type
1	1998	Burnt Cabins, PA (HWY-98-MH-033)	6	16	0	Frontal impact
2	1998	Old Bridge, NJ (HWY-99-MH-007)	8	14	7	Rollover
3	1999	Santa Fe, NM (HWY-99-FH-012)	2	35[A]	1	Rollover
4	1999	New Orleans, LA (HWY-99-MH-017)	22	21	10	Frontal impact[B]
5	1999	Braidwood, IL (HWY-99-FH-015)	1	23	2	Rollover
6	1999	Canon City, CO (HWY-00-FH-011)	2	57	53	Rollover
7	2000	Eureka, MO (HWY-00-IH-051)	0	25	0	Frontal impact
8	2001	Allamuchy, NJ (HWY-01-FH-011)	0	39	0	Rollover
9	2001	Bay St. Louis, MO (HWY-01-IH-024)	0	16	0	Frontal impact[B]
10	2001	Fairplay, CO (HWY-01-IH-028)	0	45	12	Rollover
11	2001	Pleasant View, TN (HWY-01-FH-03)	1	43	1	Rollover
12	2002	Manchester, TN (HWY-02-IH-002)	6	Unknown[C]	6	Rollover
13	2002	Loraine, TX (HWY-02-MH-021)	3	29	0	Frontal impact
14	2002	Victor, NY (HWY-02-MH-025)	5	41	6	Rollover
15	2002	Nephi, UT (HWY-03-IH-001)	6	20	13	Rollover
16	2003	Hewitt, TX (HWY-03-MH-022)	5	29	15	Rollover
17	2003	Tallulah, LA (HWY-04-MH-002)	8	6	1	Frontal impact
18	2003	Apache Co., AZ	0	44	0	Rollover

[1] National Transportation Safety Board, *Bus Crashworthiness Issues*, Highway Special Investigation Report NTSB/SIR-99/04 (Washington, DC: NTSB, 1999).

	Year	Accident	Passenger Fatalities	Injuries	Ejections	Crash type
		(HWY-04-IH-007)				
19	2004	North Hudson, NY (HWY-04-FH-015)	0	47	0	Frontal impact
20	2003	Anahuac, TX (HWY-04-FH-026)	1	35	0	Frontal impact
21	2004	Phoenix, AZ (HWY-04-IH-029)	1	38	0	Frontal impact
22	2004	Jackson, TN (HWY-04-IH-035)	2	18	0	Frontal impact
23	2004	Turrell, AR (HWY-05-MH-006)	14	15	30	Rollover
24	2005	Geneseo, NY (HWY-05-FH-017)	3	20	0	Frontal impact
25	2005	Baltimore, MD (HWY-05-FH-031)	0	33	0	Rollover
26	2005	Osseo, WI (HWY-06-MH-003)	4	35	1	Frontal impact
27	2006	Westport, NY (HWY-06-MH-026)	4	48	22	Rollover
28	2006	Auburn, MA (HWY-06-IH-028)	0	34	0	Rollover
29	2007	Atlanta, GA (HWY-07-MH-015)	6	28	12	Frontal/rollover
30	2007	Clearfield, PA (HWY-07-IH-020)	2	25	2	Rollover
31	2007	Bowling Green, KY (HWY-07-IH-022)	1	64	10	Rollover
32	2008	Victoria, TX [D] (HWY-08-MH-001)	1	46	1	Rollover
33	2008	Mexican Hat, UT (HWY-08-MH-012)	9	44	50	Rollover
Total			123	1,033	255	

[A]Driver injuries unknown.
[B]Run-off-road, then frontal impact into terrain.
[C]Driver attacked by passenger; subsequent injuries unknown.
[D]Lap belts available; none reportedly were used.

Actions needed by States

HIGHWAY

Improve Child Occupant Protection

- Enact State laws requiring booster seats for young children up to age 8.

Enact Primary Seat Belt Enforcement Laws

- Increase number of people who wear seat belts through stronger enforcement laws that don't restrict officers to observing another offense first.

Reduce Distractions for Young Drivers

- Prohibit use of interactive wireless communications devices by young novice drivers.
- Restrict the number of teen passengers traveling with young novice drivers.
- Enact graduated driver licensing legislation.

Eliminate Hard Core Drinking Driving

- Enact legislation to reduce crashes involving repeat offenders who drink large amounts of alcohol, including:
  - Frequent, statewide sobriety checkpoints.
  - More effective measures (sanctions/treatment) for first time arrests with high blood alcohol concentration and repeat offenders.
  - Zero blood alcohol requirement for those already convicted of driving while intoxicated.
  - Administrative license revocation for refusing to take or failing an evidential test for alcohol.
  - Vehicle sanctions for DWI offenders to separate drinking from driving.
  - Elimination of plea-bargaining DWI offenses and programs that divert offenders and purge offense records.
  - DWI offense records retention for at least 10 years to identify repeat offenders.
  - Special sanction court-based programs such as DWI courts for hard core DWI offenders.

MARINE

Enhance Recreational Boating Safety

- Require mandatory education of boat operators.
- Require use of life jackets by children.

National Transportation Safety Board
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November 2008

NTSB MOST WANTED LIST

Transportation Safety Improvements

2009

Critical changes needed to reduce transportation accidents and save lives.

NTSB MOST WANTED LIST

AVIATION: The Federal Aviation Administration should:

Improve Safety of Emergency Medical Services Flights

- Conduct all flights with medical personnel on board in accordance with commuter aircraft regulations.
- Develop and implement flight risk evaluation programs.
- Require formalized dispatch and flight-following procedures including up-to-date weather information.
- Install terrain awareness and warning systems on aircraft.

Improve Runway Safety

- Give immediate warnings of probable collisions/incursions directly to cockpit flight crews.
- Require specific air traffic control clearance for each runway crossing.
- Install cockpit moving map displays or automatic systems to alert pilots of attempted takeoffs from taxiways or wrong runways.
- Require landing distance assessment with an adequate safety margin.

Reduce Dangers to Aircraft Flying in Icing Conditions

- Use current research on freezing rain and large water droplets to revise the way aircraft are designed and approved for flight in icing conditions.
- Apply revised icing requirements to currently certificated aircraft.
- Require that airplanes with pneumatic deice boots activate boots as soon as the airplane enters icing conditions.

Improve Crew Resource Management

- Require commuter and on-demand air taxi flight crews to receive crew resource management training.

Require Image Recorders

- Install crash-protected image recorders in cockpits to give investigators more information to solve complex accidents.

Reduce Accidents and Incidents Caused by Human Fatigue

- Set working hour limits for flight crews, aviation mechanics and air traffic controllers based on fatigue research, circadian rhythms, and sleep and rest requirements.*
- Develop a fatigue awareness and countermeasures program for air traffic controllers.**

MARINE: The U.S. Coast Guard should:

Reduce Accidents and Incidents Caused by Human Fatigue

- Set working hour limits for mariners based on fatigue research, circadian rhythms, and sleep and rest requirements.

NTSB ACTION/TIMELINESS CLASSIFICATION

- Unacceptable response
- Acceptable response, progressing slowly
- Acceptable response, progressing in a timely manner

Actions needed by Federal Agencies

HIGHWAY: The Federal Motor Carrier Safety Administration should:

Restrict Use of Cellular Telephones

- Prohibit cellular telephone use by commercial drivers of school buses and motorcoaches, except in emergencies.

Require On-board Electronic Recorders

- Require all interstate commercial vehicle carriers to use electronic on-board recorders to collect data on both driver hours of operation and accident conditions.

Improve Safety of Motor Carrier Operations

- Prevent motor carriers from operating if they put vehicles with mechanical problems on the road or unqualified drivers behind the wheel.

Prevent Medically Unqualified Drivers from Operating Commercial Vehicles

- Establish a comprehensive medical oversight program for interstate commercial drivers.
- Ensure that medical examiners are qualified.
- Track all medical certificate applications.
- Enhance oversight and enforcement of invalid certificates
- Provide mechanisms for reporting medical conditions.

The National Highway Traffic Safety Administration should:

Prevent Collisions by Using Enhanced Vehicle Safety Technology

- Require adaptive cruise control and collision warning system standards for all new passenger and commercial vehicles.

Enhance Protection of Motorcoach Passengers

- Redesign motorcoach window emergency exits so they can be easily opened.
- Issue standards for stronger bus roofs; require them in new motorcoaches.
- Devise new standards to protect motorcoach passengers from being thrown out of their seats or ejected when a bus sustains an impact or rolls over.

Enhance Protection of School Bus Passengers

- Devise new standards to protect school bus passengers from being thrown out of their seats or ejected when a bus sustains an impact or rolls over.

PIPELINE: The Pipeline and Hazardous Materials Safety Administration should:

Reduce Accidents and Incidents Caused by Human Fatigue

- Set working hour limits for pipeline controllers based on fatigue research, circadian rhythms, and sleep and rest requirements.

** This recommendation requires action by both the FAA and the National Air Traffic Controllers Association.*

*** This recommendation also issued to National Air Traffic Controllers Association.*

NTSB Safety Recommendations to NHTSA on the Most Wanted List of Transportation Safety Improvements

Status as of May 2009

Recommendation status	Count
Open—Acceptable Response (OAA)	5
Open—Unacceptable Response (OUA)	2
Total:	**7**

Motorcoach Safety

Special Investigation: "Selective Motorcoach Issues," issued on 2/26/1999 [NTSB/SIR-99-01]

H-99-009 OAA — THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: REVISE THE FEDERAL MOTOR VEHICLE SAFETY STANDARD 217, "BUS WINDOW RETENTION AND RELEASE," TO REQUIRE THAT OTHER THAN FLOOR-LEVEL EMERGENCY EXITS CAN BE EASILY OPENED AND REMAIN OPEN DURING AN EMERGENCY EVACUATION WHEN A MOTORCOACH IS UPRIGHT OR AT UNUSUAL ATTITUDES.

Special Investigation: "Bus Crashworthiness Issues," issued on 11/2/1999 [NTSB/SIR-99-04]

H-99-047 OUA — THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: IN 2 YEARS, DEVELOP PERFORMANCE STANDARDS FOR MOTORCOACH OCCUPANT PROTECTION SYSTEMS THAT ACCOUNT FOR FRONTAL IMPACT COLLISIONS, SIDE IMPACT COLLISIONS, REAR IMPACT COLLISIONS, AND ROLLOVERS.

H-99-050 OUA — THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: IN 2 YEARS, DEVELOP PERFORMANCE STANDARDS FOR MOTORCOACH ROOF STRENGTH THAT PROVIDE MAXIMUM SURVIVAL SPACE FOR ALL SEATING POSITIONS AND THAT TAKE INTO ACCOUNT CURRENT TYPICAL MOTORCOACH WINDOW DIMENSIONS.

School Bus Safety

Special Investigation: "Bus Crashworthiness Issues," issued on 11/2/1999 [NTSB/SIR-99-04]

H-99-045 OAA — THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: IN 2 YEARS, DEVELOP PERFORMANCE STANDARDS FOR SCHOOL BUS OCCUPANT PROTECTION SYSTEMS THAT ACCOUNT FOR FRONTAL IMPACT COLLISIONS, SIDE IMPACT COLLISIONS, REAR IMPACT COLLISIONS, AND ROLLOVERS.

H-99-046 OAA — THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: ONCE PERTINENT STANDARDS HAVE BEEN DEVELOPED FOR SCHOOL BUS OCCUPANT PROTECTION SYSTEMS, REQUIRE NEWLY MANUFACTURED SCHOOL BUSES TO HAVE AN OCCUPANT CRASH PROTECTION SYSTEM THAT MEETS THE NEWLY DEVELOPED PERFORMANCE STANDARDS AND RETAINS PASSENGERS, INCLUDING THOSE IN CHILD SAFETY RESTRAINT SYSTEMS, WITHIN THE SEATING COMPARTMENT THROUGHOUT THE ACCIDENT SEQUENCE FOR ALL ACCIDENT SCENARIOS.

Enhanced Vehicle Safety Technologies

Special Investigation: "Vehicle and Infrastructure-Based Technology for the Prevention of Rear-End Collisions," issued on 5/25/2001 [NTSB/SIR-01-01]

H-01-006 OAA — THE NTSB RECOMMENDS THAT THE DOT: COMPLETE RULEMAKING ON ADAPTIVE CRUISE CONTROL AND COLLISION WARNING SYSTEM PERFORMANCE STANDARDS FOR NEW COMMERCIAL VEHICLES. AT A MINIMUM, THESE STANDARDS SHOULD ADDRESS OBSTACLE DETECTION DISTANCE, TIMING OF ALERTS, AND HUMAN FACTORS GUIDELINES, SUCH AS THE MODE AND TYPE OF WARNING.

H-01-008 OAA — THE NTSB RECOMMENDS THAT THE DOT: COMPLETE RULEMAKING ON ADAPTIVE CRUISE CONTROL AND COLLISION WARNING SYSTEM PERFORMANCE STANDARDS FOR NEW PASSENGER CARS. AT A MINIMUM, THESE STANDARDS SHOULD ADDRESS OBSTACLE DETECTION DISTANCE, TIMING OF ALERTS, AND HUMAN FACTORS GUIDELINES, SUCH AS THE MODE AND TYPE OF WARNING.

NATIONAL TRANSPORTATION SAFETY BOARD
Public Meeting of April 21, 2009
Highway Accident Report
Motorcoach Run-Off-the-Road and Rollover
U.S. Route 163, Mexican Hat, Utah
January 6, 2008
NTSB/HAR-09/01

This is a synopsis from the Safety Board's report and does not include the Board's rationale for the conclusions, probable cause, and safety recommendations.

EXECUTIVE SUMMARY

On January 6, 2008, about 3:15 p.m. mountain standard time, a 2007 Motor Coach Industries 56−passenger motorcoach with a driver and 52 passengers on board departed Telluride, Colorado, en route to Phoenix, Arizona, as part of a 17-motorcoach charter. The motorcoach passengers were returning from a 3-day ski trip. The normal route from Telluride to Phoenix along Colorado State Route 145 was closed due to snow, and the lead driver planned an alternate route that included U.S. Route 163/191 through Utah.

About 8:02 p.m., the motorcoach was traveling southbound, descending a 5.6−percent grade leading to a curve to the left, 1,800 feet north of milepost 29 on U.S. Route 163. After entering the curve, the motorcoach departed the right side of the roadway at a shallow angle, striking the guardrail with the right-rear wheel and lower coach body about 61 feet before the end of the guardrail. The motorcoach traveled approximately 350 feet along the foreslope (portion of roadside sloping away from the roadway), with the right tires off the roadway. The back tires lost traction as the foreslope transitioned into the drainage ditch.

The motorcoach rotated in a counterclockwise direction as it descended an embankment. The motorcoach overturned, struck several rocks in a drainage ditch bed at the bottom of the embankment, and came to rest on its wheels. During the 360° rollover sequence, the roof of the motorcoach separated from the body, and 50 of the 53 occupants were ejected. As a result this accident, 9 passengers were fatally injured, and 43 passengers and the driver received injuries ranging from minor to serious.

CONCLUSIONS

1. The driver was neither distracted by his cellular telephone nor impaired by illicit drugs at the time of the accident.
2. Although it was unlikely that the driver was under the influence of alcohol, the delay in collecting a toxicological specimen prevents the National Transportation Safety Board from conclusively ruling out alcohol as a factor in this accident.
3. The weather at the time of the accident was not a factor in the motorcoach's departure from the roadway.
4. Neither the mechanical condition of the motorcoach nor the design and condition of the highway were factors in this accident.
5. The driver was experiencing diminished alertness and fatigue−related impairment due to inadequate sleep resulting from the following factors: head congestion,

possible problems acclimating to high altitude, and his sporadic use of his continuous positive airway pressure sleeping device during the accident trip.

6. The motorcoach was traveling approximately 88 mph in a 65-mph speed zone when the driver departed the road and lost control of his vehicle.
7. The driver's fatigue affected his monitoring of the motorcoach's speed.
8. The driver's reaction to the motorcoach's departure from the roadway was delayed and, by the time he executed corrective steering action, he had lost control of the vehicle.
9. None of the driver's preexisting medical conditions, except for sleep apnea, played a role in this accident.
10. Both Arrow Stage Lines and its drivers knew of the adverse weather conditions before starting the accident trip and thus intentionally engaged in a trip that would likely exceed hours-of-service regulations.
11. Arrow should have developed contingency plans to avoid hours-of-service violations associated with the return trip.
12. Because of the National Highway Traffic Safety Administration's delay in defining motorcoach occupant protection performance standards, U.S. motorcoaches have not been equipped with such systems, leaving the traveling public inadequately protected during motorcoach crashes, particularly during rollovers.
13. Basic wireless service capability is needed along high-risk rural roads and along rural roads frequently traveled by large buses to enable wireless telephone notification of accidents and emergencies.
14. Until wireless capability is extended along highly traveled rural roads, motor carriers servicing rural areas without wireless telephone coverage remain at risk of being unable to report an accident or emergency in those locations.
15. The regionalization of medical care relies on air medical support to accomplish timely long-distance patient transport without adequate contingency plans when air medical services are not available because of weather or equipment limitations.
16. Although the emergency medical service mutual aid drawn from around the region was well coordinated, long-distance ground travel delayed the availability of advanced life support care.
17. The lack of adequate data on large bus travel in rural areas—especially data related to charter and tour bus activity, travel patterns, and routes—severely limits a State's ability to assess rural road travel and hazardous locations, especially in remote areas where a tour or charter bus accident can result in large numbers of injured.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the driver's diminished alertness due to inadequate sleep resulting from a

combination of head congestion, problems acclimating to high altitude, and his sporadic use of his continuous positive airway pressure sleeping device during the accident trip. The driver's state of fatigue affected his awareness of his vehicle's excessive speed and lane position on a downhill mountain grade of a rural secondary road. Contributing to the accident's severity was the lack of an adequate motorcoach occupant protection system primarily due to the National Highway Traffic Safety Administration's delay in developing and promulgating standards to enhance the protection of motorcoach passengers.

RECOMMENDATIONS

New Recommendations

To the Federal Interagency Committee on Emergency Medical Services:

Develop a plan that can be used by the States and public safety answering points to pursue funding for enhancements of wireless communications coverage that can facilitate prompt accident notification and emergency response along high-risk rural roads, as identified under SAFETEA-LU criteria, and along rural roads having substantial large bus traffic (as defined by the criteria established in Safety Recommendation H-09-7). (H−09−4)

Evaluate the system of emergency care response to large-scale transportation-related rural accidents and, once that evaluation is completed, develop guidelines for emergency medical service response and provide those guidelines to the States. (H−09-5)

To the Utah Bureau of Emergency Medical Services:

Establish written contingency plans for response to large-scale transportation-related emergencies along rural roads traveled by tour and charter buses, such as occurred in Mexican Hat, Utah, that cannot be handled by air medical services due to inclement weather. (H−09−6)

To the Federal Highway Administration:

Develop and implement, in conjunction with the American Association of State Highway and Transportation Officials and the National Association of State Emergency Medical Services Officials, criteria based on traffic patterns, passenger volume, and bus types that can be used to assess the risks of rural travel by large buses. Use this criteria as part of the SAFETEA-LU requirement to identify and select Highway Safety Improvement Program projects. (H−09−7)

To the American Association of State Highway and Transportation Officials and to the National Association of State Emergency Medical Services Officials:

Work with the Federal Highway Administration to develop and implement criteria based on traffic patterns, passenger volume, and bus types that can be used to assess the risks of rural travel by large buses. (H−09−8)

To the American Bus Association and to the United Motorcoach Association:

Inform your members through Web sites, newsletters, and conferences of the circumstances of the Mexican Hat, Utah, accident. The prepared information

should encourage charter operators to develop written contingency plans for each charter to ensure that trip planning is in place in the event of driver fatigue, incapacitation, or illness or in the event of trip delays necessitating replacement drivers to avoid hours-of-service violations and inform drivers of their trip's contingency plans. The prepared information should also provide information about the risks of operating in rural areas without wireless telephone coverage and advise members to carry mobile cellular amplifiers or satellite-based devices to communicate emergency events. (H−09−9)

To Arrow Stage Lines:

Develop written contingency plans for each charter to ensure that trip planning is in place in the event of driver fatigue, incapacitation, or illness or in the event of trip delays necessitating replacement drivers to avoid hours-of-service violations and inform drivers of their trip's contingency plans. (H−09−10)

Reiterated Recommendation

The National Transportation Safety Board reiterates the following recommendation:

To 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)

Previously Issued Recommendations Classified in This Report

The following recommendations are classified "Open – Unacceptable Response":

To the National Highway Traffic Safety Administration:

In 2 years, develop performance standards for motorcoach occupant protection systems that account for frontal impact collisions, side impact collisions, rear impact collisions, and rollovers. (H-99-47)

Once pertinent standards have been developed for motorcoach occupant protection systems, require newly manufactured motorcoaches to have an occupant crash protection system that meets the newly developed performance standards and retains passengers, including those in child safety restraint systems, within the seating compartment throughout the accident sequence for all accident scenarios. (H-99-48)

In 2 years, develop performance standards for motorcoach roof strength that provide maximum survival space for all seating positions and that take into account current typical motorcoach window dimensions. (H−99−50)

Once performance standards have been developed for motorcoach roof strength, require newly manufactured motorcoaches to meet those standards. (H-99-51)