



# National Transportation Safety Board

Washington, DC 20594

Office of the Chairman

October 2, 2014

Docket Management Facility (M-30)  
US Department of Transportation  
West Building Ground Floor  
Room W12-140  
1200 New Jersey Avenue, SE  
Washington, DC 20590-0001

Attention: Docket No. NHTSA-2014-0085

Dear Sir or Madam:

The National Transportation Safety Board (NTSB) has reviewed the National Highway Traffic Safety Administration (NHTSA) Notice of Proposed Rulemaking (NPRM) “Federal Motor Vehicle Safety Standards; Bus Rollover Structural Integrity, Motorcoach Safety Plan; Proposed Rule,” which was published at *79 Federal Register* 46090 on August 6, 2014. The proposed rule is intended to enhance the rollover structural integrity of certain types of large buses—generally, over-the-road buses of any weight (commonly referred to as motorcoaches)—and non-over-the-road buses with gross vehicle weight ratings (GVWR) greater than 11,793 kilograms (kg), and proposes a definition for over-the-road buses.

## **Bus Rollover Structural Integrity**

The NTSB is encouraged that NHTSA has issued an NPRM concerning bus rollover structural integrity. Recognizing that occupant protection involves vehicle designs that prevent ejection, maintain survivable space, and minimize sharp interior surfaces that can lead to injury, the NTSB has long advocated for rollover structural integrity for all buses, including motorcoaches and medium-size buses weighing over 10,000 pounds. The proposed requirements for rollover structural integrity in this NPRM will address our longstanding Safety Recommendations H-99-50 and -51, issued in our special investigation report on bus crashworthiness, examining the lack of occupant protection standards for motorcoaches.<sup>1</sup> Our safety recommendations on bus and motorcoach occupant protection have appeared on the NTSB Most Wanted List since 2000.<sup>2</sup>

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

<sup>2</sup> The Most Wanted List represents the NTSB’s advocacy priorities. It is designed to increase awareness of, and support for, the most critical changes needed to reduce transportation accidents and save lives. The Most Wanted List issue associated with the topic of this NPRM is titled “Strengthen Occupant Protection in Transportation.” It covers all modes of transportation, including highway. See [www.nts.gov](http://www.nts.gov) for information on the Most Wanted List.

Our highway crash investigations have shown that current bus designs lack adequate crashworthiness protection for occupants; buses often lack sufficient roof strength to limit intrusion into occupant seating areas during a rollover event. They also are often built with large side windows that can break, become dislodged, or open during an overturn. We are encouraged that the proposed rule includes performance standards intended to ensure that, during a rollover, restrained occupants have enough survival space, seats and overhead luggage racks stay secured, window glazing remains attached to its mounting, and emergency exits stay closed (but remain operable after the crash).

Despite our overall support for the proposed rulemaking, we have some concerns about the rule. In particular, we are concerned that the scope of this NPRM is limited to larger buses; however, medium-size buses also need occupant protection in the event of rollover.

### **Over-the-Road Bus Definition**

Regulatory definitions influence the nature and scope of public policy decisions. Definitions provide the parameters on which classifications are based; and classifications determine the accident data to be gathered, how the data are analyzed, and how the results are interpreted. The interpretation of these results affects how research funding is allocated and, ultimately, what regulations are enacted. The “Moving Ahead for Progress in the 21<sup>st</sup> Century Act” (MAP-21)<sup>3</sup> defined motorcoaches as “over-the-road buses,” which were further defined as “bus[es] characterized by an elevated passenger deck located over a baggage compartment.” In this NPRM, NHTSA proposes to adopt the MAP-21 definition of a motorcoach.

In the NPRM, NHTSA states that it believes the vast majority of over-the-road buses have GVWRs greater than 11,793 kg (26,000 pounds); however, NHTSA recognizes that it is possible to design a bus with an elevated passenger deck over a baggage compartment with a GVWR less than 11,793 kg. The NPRM addresses all buses with GVWRs greater than 11,793 kg (except transit buses and school buses) and over-the-road buses with GVWRs less than 11,793 kg.

We recognize that this proposed definition of motorcoach is consistent with the one NHTSA used in the 2013 final rule on occupant crash protection.<sup>4</sup> However, the definition provided in the NPRM fails to include a type of bus often used similarly to a motorcoach—medium-size buses weighing less than 26,000 pounds. Such buses are typically built as body-on-chassis and not with an elevated passenger deck over a baggage compartment, so they do not fall within the “over-the-road bus” definition.

We previously raised our concern about this limitation of the motorcoach definition in our comments on NHTSA’s NPRM concerning occupant crash protection for motorcoaches.<sup>5</sup> In our response to the 2010 NPRM, we stated that all buses with GVWRs above 10,000 pounds should be required to meet standards addressing roof strength, occupant protection, and window

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<sup>3</sup> Pub. L. 112–141.

<sup>4</sup> See 49 *Code of Federal Regulations* Part 571; *Federal Motor Vehicle Safety Standards* “Occupant Protection,” published at 78 *Federal Register* 70416.

<sup>5</sup> This NPRM was published at 72 *Federal Register* 50958. NTSB comments on this NPRM were dated October 18, 2010.

glazing. However, on November 25, 2013, NHTSA published a final rule that excluded medium-size buses from the definition of motorcoaches and thus from the requirement that they be equipped with passenger lap/shoulder belts.<sup>6</sup> We contend that this is a deficiency in the final rule.

As recently as July 22, 2014, we wrote to NHTSA regarding the inconsistent terminology and definitions pertaining to buses and motorcoaches, with respect to the status of Safety Recommendation H-10-2, which asked you to take the following action:

#### H-10-2

To maintain consistency in bus body classifications and to clarify the scope of bus safety initiatives, develop regulatory definitions and classifications for each of the different bus body types that would apply to all US Department of Transportation agencies and promote use of the definitions among the bus industry and state governments.<sup>7</sup>

Because the 2013 final rule on occupant protection did not include definitions or classifications for each bus body type that could be used by US Department of Transportation (DOT) agencies, industry, or states, we found that NHTSA had not addressed the issue either as recommended or by an acceptable alternative. We classified Safety Recommendation H-10-2 “Closed—Unacceptable Action.”

### **NHTSA Fatality Analysis Reporting System Data**

NHTSA may have chosen to exclude medium-size buses from the proposed rulemaking because the data it used in developing the rulemaking did not provide sufficient support to extend it to this bus category. We believe that coding inaccuracies in the NHTSA Fatality Analysis Reporting System (FARS) data may have resulted in undercounting of bus occupant fatalities in medium-size buses.

For example, according to the NPRM, no fatalities involving rear and side impacts in “cross-country/intercity” and “unknown” bus body type categories occurred during the 10-year period from 2000 to 2009. However, we investigated a multiple-fatality accident involving a medium-size bus that was struck in the rear in Hampshire, Illinois, on October 1, 2003.<sup>8</sup> In that crash, 8 bus passengers were killed, 12 sustained injuries, and 6 were ejected or partially ejected. This fatal rear-end bus crash was not reported in NHTSA’s NPRM data because in the FARS,

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<sup>6</sup> See 49 *Code of Federal Regulations* Part 571; *Federal Motor Vehicle Safety Standards* “Occupant Protection,” published at 78 *Federal Register* 70416.

<sup>7</sup> Safety Recommendation H-10-2 was issued in the NTSB’s report of its investigation of an accident that occurred in 2009 in Dolan Springs, Arizona. (See *Bus Loss of Control and Rollover, Dolan Springs, Arizona, January 30, 2009*, Highway Accident Report NTSB/HAR-10/01 [Washington, DC: National Transportation Safety Board, 2010]). Additional recommendations from this report will be referenced later in this response.

<sup>8</sup> *Multivehicle Collision on Interstate 90 Hampshire-Marengo Toll Plaza Near Hampshire, Illinois, October 1, 2003*, Highway Accident Report NTSB/HAR-06/03 (Washington, DC: National Transportation Safety Board, 2006).

the Hampshire bus body type was miscoded as a *transit* bus although it was being operated by an interstate passenger-carrier company and the use category was listed as *charter*.<sup>9</sup>

We also found evidence of undercounting of bus occupant fatalities through our review of the Buses Involved in Fatal Accidents (BIFA) database. BIFA is a University of Michigan Transportation Research Institute database in which data supplemental to the FARS files from 1999 through 2010 were collected by conducting a survey about the vehicle, company, driver, trip, and crash for each fatal crash involving a bus. To develop the BIFA data, detailed questions were asked about the bus's physical configuration and used to enable accurate classification. Because BIFA expands on FARS data, it may be considered more exact and complete than the corresponding fatal crash records in FARS (Jarossi, Hershberger, and Woodrooffe 2012).<sup>10</sup>

Analyses of BIFA data for 2000–2009 found that 128 medium-size buses, not including motorcoaches, were involved in fatal accidents, and 58 occupants died in medium-size bus crashes. By contrast, analyses of FARS data identified only 90 medium-size buses involved in fatal accidents and 40 bus occupant deaths in medium-size buses. This comparison suggests that, because it relied on FARS, the NPRM underrepresented the numbers of crashes and occupant deaths associated with medium-size buses.

### **Medium-Size Bus Crashes**

Like motorcoaches, medium-size buses travel at highway speeds and, due to their smaller size and lesser weight, are at higher risk for occupant injuries and deaths when crashes occur. Excepting medium-size buses weighing between 10,000 and 26,000 pounds from the requirements of the proposed rule would make such buses the only remaining class of high-occupancy passenger-carrying vehicles without occupant protection standards.<sup>11</sup> As can be seen in the examples below, in the past 5 years, we have investigated medium-size bus crashes in which the vehicle's roof strength and rollover integrity were lacking, resulting in fatalities and serious injuries to passengers. Had these vehicles been required to meet occupant protection requirements, the outcomes of these crashes might have been less severe.

#### ***Lake Placid, Florida***

In February 2010, we investigated a crash in Lake Placid, Florida, involving a 2001 Ford/Krystal 32-passenger medium-size bus with a GVWR of 19,000 pounds and an overall

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<sup>9</sup> Public transit agencies account for just over half (53 percent) of the annual sales for medium-size buses; the buses are primarily used for paratransit services. Paratransit services provide public or private transportation options, typically via vans and small buses, for senior citizens and persons with special needs. While some federal and state agencies already require that paratransit buses comply with the roof strength standards detailed in Federal Motor Vehicle Safety Standard 220, it appears that most do not, thereby placing many of those people who use paratransit at higher risk for injury during crashes. Of those medium-size buses not in paratransit service, about 20 percent are sold to churches, schools, and communities for use as activity buses; about 10 percent are sold to tour and charter companies; and about 10 percent are sold to businesses to be used as shuttle buses.

<sup>10</sup> See Linda Jarossi, Daniel Hershberger, and John Woodrooffe. 2012. *Buses Involved in Fatal Accidents Codebook 2009*. Center for National Truck and Bus Statistics, University of Michigan Transportation Research Institute. Ann Arbor, MI. See [www.cmisst.org/bifa](http://www.cmisst.org/bifa), accessed September 3, 2014.

<sup>11</sup> As NHTSA acknowledged in the NPRM, nothing in MAP-21 limits the agency's ability to examine other types of buses pursuant to its existing authority under the Motor Vehicle Safety Act.

length of 33 feet.<sup>12</sup> The bus's interior configuration had eight rows of forward-facing motorcoach-style seats behind the driver. Overhead luggage racks were installed above the seats. After a collision, the bus rolled onto its roof, ejecting eight passengers, three of whom were killed. Twenty-eight of the 31 occupants were injured. The roof of the Lake Placid bus sustained significant damage during the rollover.

### *Dolan Springs, Arizona*

The NTSB investigated the January 30, 2009, crash in Dolan Springs, Arizona, which involved a 29-passenger medium-size bus with a GVWR of 19,500 pounds and an overall length of 32 feet.<sup>13</sup> The bus's interior configuration had seven rows of forward-facing motorcoach-style seats behind the driver. Overhead luggage racks were located above the seats, and storage space for luggage was provided in the rear of the bus. In this crash, the bus overturned 1.25 times after it left the roadway, coming to rest on its right side. During the rollover, 15 of the 17 occupants, including the driver, were ejected. Seven passengers were killed, and nine passengers and the driver were injured. This crash provided a prime example of why medium-size buses need occupant protection as much as larger buses do. As a result of the Dolan Springs investigation, we issued Safety Recommendations H-10-3 and -4, asking NHTSA to take the following actions:

#### H-10-3

In your rulemaking to improve motorcoach roof strength, occupant protection, and window glazing standards, include all buses with a gross vehicle weight rating above 10,000 pounds, other than school buses.

#### H-10-4

Develop performance standards for all newly manufactured buses with a gross vehicle weight rating above 10,000 pounds to require that overhead luggage racks are constructed and installed to prevent head and neck injuries and remain anchored during an accident sequence.

We classified Safety Recommendations H-10-3 and -4 "Open—Unacceptable Response" because the 2013 final rule on occupant crash protection excepted buses with GVWRs between 10,000 and 26,000 pounds.

In addition, medium-size buses are built and designed similarly to one another and may only vary by a few hundred pounds, creating a large disparity in the proposed rollover structural integrity requirements, which would include any non-over-the-road bus as long as it weighs over 26,000 pounds. For example, on September 29, 2010, a crash occurred near Bethesda, Maryland, involving a 2006 Freightliner/General Coach America 29-passenger medium-size bus with a GVWR of 26,000 pounds and an interior configuration with eight rows of forward-facing motorcoach-style seats behind the driver.<sup>14</sup> Eleven passengers (including one child who was

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<sup>12</sup> Lake Placid, Florida, investigation HWY-10-FH-009.

<sup>13</sup> See NTSB/HAR-10/01. The Dolan Springs bus was a 2007 Chevrolet/Starcraft model XLT 32 GM option.

<sup>14</sup> Bethesda, Maryland, investigation HWY-10-MH-022.

ejected from the bus) sustained injuries when the bus rolled 360 degrees down a steep bridge embankment.

According to the NPRM, the Bethesda bus would be considered a non-over-the-road bus and, due to its weight (26,000 pounds), it would be subject to the proposed safety requirements; however, we note that even though it was over the 26,000-pound weight threshold, the medium-size bus in the Bethesda crash was built the same (chassis-on-body design) and had the same 29-passenger seating capacity as the bus in the Dolan Springs accident. However, because of the weight threshold in the NPRM, these two buses would have significantly different levels of occupant protection. Roof crush performance standards are essential to protecting occupants of all types of passenger buses. We believe occupant protection should be afforded to every passenger on buses weighing over 10,000 pounds.

During the Dolan Springs crash investigation, we found that the use of medium-size buses is increasing because of their low retail cost compared to motorcoaches, relatively large passenger capacity, and resulting ability to generate high revenues.<sup>15</sup> Compared to over-the-road buses, medium-size buses have a similar interior configuration, only slightly less passenger capacity, and a significantly lower purchase price.<sup>16</sup> We agree with NHTSA's belief, as stated in the NPRM, that these buses will pose still greater risks in the future when more medium-size buses are in operation, increasing their exposure to rollovers and other crash events. We believe that crashes such as those cited above, and the fatalities and serious injuries that result from them, demonstrate that medium-size buses should not be excepted from the occupant protection standards for rollover structural integrity, seat anchorages, and overhead luggage racks proposed in the NPRM.

### **Specialized Bus Types**

We support NHTSA's decision to have this NPRM explicitly state, as did the 2013 final rule on occupant crash protection, that over-the-road buses cannot qualify as *transit buses* and thus be exempt from proposed requirements. We also support the NHTSA position in the NPRM on *perimeter-seating buses*, which provides that, if such a bus meets the proposed definition of an over-the-road bus (elevated passenger deck over a baggage compartment), then it would be covered by the proposed requirements.

We are encouraged that NHTSA is including the lower/enclosed sections of *double-decker buses* (or the enclosed upper section of a double-decker bus) under the proposed

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<sup>15</sup> The Dolan Springs report (NTSB/HAR-10/01) cites a 2007 Federal Transit Administration report that describes a typical medium-size bus as being 25–35 feet long, having a GVWR of 10,000–30,000 pounds, and providing seating for 16–40 passengers. By comparison, a typical motorcoach is 45 feet long and seats 55 passengers.

<sup>16</sup> See [www.starcraftbus.com](http://www.starcraftbus.com) website, accessed August 21, 2014. Bus manufacturer Starcraft stated that its medium-size buses have “fully welded steel cage construction meeting all applicable FMVSS [*Federal Motor Vehicle Safety Standards*] requirements,” are available with overhead luggage racks, and have large windows measuring 36 inches wide by 36 inches high constructed of tempered safety glass, at an “affordable price.” A study cited in the Dolan Springs report noted that costs for a new medium-size bus ranged from \$50,000–\$175,000 in 2007, compared to an average cost of \$450,000 for a new motorcoach. For more information, see *Evaluation of the Market for Small-to-Medium-Sized Cutaway Buses*, Report MI-26-7280.07.1 (Washington, DC: US Department of Transportation, Federal Transit Administration, December 2007), and *The Economic Impacts and Social Benefits of the US Motorcoach Industry* (Arlington, Virginia: Nathan Associates, 2008), p. 14.

test procedure for compliance with the requirements of the proposed rule. This inclusion accounts for vehicle structures that could intrude into the survival space of the lower level occupant space or the enclosed upper level.

We also support differentiating *school buses* from over-the-road buses for the purposes of the rollover-specific NPRM. We believe that Federal Motor Vehicle Safety Standard 220 for school buses continues to be appropriate for the design and construction of school buses.

### **Additional Comments**

In the NPRM, you requested comments on openings on buses, other than the emergency exits, that could become ejection portals. We are aware that some motorcoaches are being equipped with glass roofs or “moon roofs” to provide an enhanced view for bus passengers. We believe that such roofs may pose risks as large ejection portals in a rollover and should be addressed in the NPRM.

Section S5.4 of the NPRM refers specifically to emergency exits in the roof and rear of the bus. We encourage you to consider whether buses designed with side emergency exit doors should also be required to meet the standard.

The NPRM proposes requiring that the side window glazing opposite the impacted side of a vehicle remain attached to its mounting following impact. We ask you to consider requiring that the window glazing on both the impacted and opposite (to impact) sides remain attached. This requirement would ensure that ejection portals are not created on the impacted side, which would constitute a risk to belted and unbelted passengers if a bus rolls more than a quarter turn. This language change would also provide NHTSA flexibility in evaluating the enclosed upper section of a double-decker bus, where the impacted side windows may not contact the ground at the same time as the lower windows.

### **Summary**

The NTSB is encouraged that NHTSA has issued this NPRM concerning rollover structural integrity for buses. We have long believed that buses should have restraint systems to maintain occupants within the vehicle as well as sufficient structural integrity to minimize intrusion into the occupant space in case of crashes, and this NPRM represents another phase of NHTSA’s progress in these important safety areas. We recognize that NHTSA’s rollover testing efforts and the publication of this NPRM are significant safety accomplishments. We support NHTSA’s continuing work to realize the elements of the November 2009 DOT Motorcoach Safety Action Plan.<sup>17</sup>

We emphasize that our major concern regarding this NPRM is that the proposed rulemaking will not apply to certain medium-size buses, which means that they will not be required to have sufficient structural integrity in the event of a rollover crash. We continue to believe that passengers of buses of all sizes should have a reasonable expectation of crashworthiness protection in the vehicles they occupy. The high occupancies of medium-size

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<sup>17</sup> *Motorcoach Safety Action Plan*, DOT HS 811 177 (Washington, DC: US Department of Transportation, November 2009).

buses with GVWRs over 10,000 pounds and the highway speeds at which they travel can result (and have resulted) in crashes with large numbers of fatalities and serious injuries; consequently, passengers in these vehicles should be protected in the event of a rollover crash. We again urge NHTSA to include medium-size buses in the NPRM on rollover structural integrity, as well as in its definition of over-the-road buses.

We appreciate the opportunity to comment on this NPRM concerning bus crashworthiness and look forward to working with NHTSA in the near future to address the concerns presented in these comments.

Sincerely,