



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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**Date:** August 4, 2003

**In reply refer to:** H-03-22

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The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organizations to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation addresses the need for a training program for drivers of 12- and 15-passenger vans. The recommendation is derived from the Safety Board's investigation of the May 8, 2001, rollover of a 1993 Dodge 15-passenger van on U.S. Route 82 near Henrietta, Texas, and the July 1, 2001, overturn of a 1989 Dodge Ram 15-passenger van on U.S. Route 220 near Randleman, North Carolina,<sup>1</sup> and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued 16 safety recommendations, 1 of which is addressed to the American Automobile Association and the National Safety Council. Information supporting this recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

On May 8, 2001, about 8:57 a.m., central daylight time, a 1993 Dodge 15-passenger van was eastbound on U.S. Route 82 near Henrietta, Texas, en route from Burkburnett, Texas, to an outlet mall in Gainesville, Texas. The driver and 11 passengers, all members of the First

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<sup>1</sup> For additional information, read National Transportation Safety Board, *Dodge 15-Passenger Van Rollover on U.S. Route 82 Near Henrietta, Texas, on May 8, 2001, and Dodge 15-Passenger Van Overturn on U.S. Route 220 Near Randleman, North Carolina, on July 1, 2001*, Highway Accident Report NTSB/HAR-03/03 (Washington, DC: NTSB, 2003).

Assembly of God Church, occupied the van. As the vehicle approached milepost 538 in the left lane, at a calculated speed of 61 to 67 mph, the left rear tire experienced a tread separation and blowout; subsequently, the van departed the roadway and rolled over at least two times in the median, ejecting seven passengers before coming to final rest. The driver and three of the ejected passengers sustained fatal injuries, and eight passengers sustained serious injuries.

On July 1, 2001, about 2:30 p.m., eastern daylight time, a 1989 Dodge Ram 15-passenger van was northbound in the left lane on U.S. Route 220, near Randleman, North Carolina, en route from Myrtle Beach, South Carolina, to Roanoke, Virginia. The van, owned by Virginia Heights Baptist Church of Roanoke, Virginia, was occupied by the driver and 13 passengers, ages 13 to 19. As the vehicle approached the Level Cross, North Carolina, exit, at a witness-estimated speed of 65 mph, the left rear tire experienced a tread separation and blowout; subsequently, the van moved from the left lane into the right lane, then back into the left lane, where it overturned and came to rest in the travel lanes. During the accident sequence, four passengers were ejected, one of whom was fatally injured and three of whom sustained serious injuries; the driver and the other nine passengers sustained injuries ranging from none to serious.

The National Transportation Safety Board determined that the probable cause of the accidents was tire failure, the drivers' response to that failure, and the drivers' inability to maintain control of their vans. Contributing to the accidents was the deteriorated condition of the tires, as a result of the churches' lack of tire maintenance, and the handling characteristics of the vans. Contributing to the severity of the injuries was the lack of appropriate *Federal Motor Vehicle Safety Standards* applicable to 15-passenger vans in the areas of restraints and occupant protection.

The National Highway Traffic Safety Administration's (NHTSA's) study on *The Rollover Propensity of Fifteen-Passenger Vans* demonstrated that 15-passenger vans are inherently unstable when loaded to the level for which they are designed—carrying more than 10 passengers. NHTSA therefore advises all van drivers to obtain specific training on the handling and operation of these vehicles. However, as investigators found during the Henrietta and Randleman accident investigations, the van owners were not aware of the information provided by NHTSA in its consumer advisory. The advisory has not reached all 15-passenger van operators, even those within the target group, such as churches, and the Henrietta and Randleman operators did not know that they should have specific training to operate the vans safely. Both accident drivers had experience operating 15-passenger vans, but no specialized training on the handling and driving characteristics of these vehicles; neither driver was able to control the van in an emergency.

As shown in the testing by Standards Testing Laboratories, Inc., and Safety Board staff, the van was controllable during an anticipated blowout, and the test driver thought that the effort required to control the vehicle was within the range of an unimpaired driver. However, even the professional test driver was unable to maintain the lane of travel in test 3 when the tires were inflated below the manufacturer's recommended inflation pressures, which were similar to those in the Henrietta accident; the van swayed from side to side as the test driver brought it under control. The professional test driver also stated that the van was more difficult to control at higher speeds, particularly with lower tire inflation pressures, and that steering inputs were magnified after the blowout. The test driver had experience operating 15-passenger vans during a

blowout, and he triggered the tire blowout himself, so the situation was not unexpected, as it was during the accidents. Further, an experiment on driver reaction to tread separation that was conducted in the National Advanced Driving Simulator found that

findings from test track studies in which test drivers were aware of an imminent tread separation may underestimate the extent to which tread separation occurring in the real world leads to instability and loss of vehicle control.<sup>2</sup>

Thus, even though the test van was configured similarly to the Henrietta van, the test did not replicate either accident in the critical area of operator behavior.

While both accident drivers were familiar with their respective vans and had driven them previously, investigators did not find evidence that either driver had experienced an emergency situation, such as tire failure, while operating the van. Both drivers are likely to have overcorrected and braked following the blowout because they did not know how to respond appropriately to the vehicle dynamics that occurred after the blowout and did not understand the potential instability problems associated with 15-passenger vans. The drivers are likely to have reacted instinctively by attempting to correct the rotation of the van while braking to slow it. Had the two drivers maintained their speed, not applied the brakes, and exerted more controlled steering, as the professional driver did during the tests, they may have been able to control their vans. Braking, the likely response on the part of both drivers, can lead to further vehicle instability during a tire failure, particularly in a fully loaded 15-passenger van with a high, rearward center of gravity. The drivers' lack of training on their vehicles' operating and handling characteristics, particularly in emergency situations, put them at a disadvantage in reacting to the blowout.

As the National Safety Council, the American Automobile Association, and most driver education programs recognize, acceleration is the appropriate response to a blowout, but that response is counterintuitive to the general public. Therefore, such groups emphasize that drivers need to refrain from braking and to decelerate slowly in the event of a tire blowout. This strategy requires that the driver provide steering input to counteract the lateral dragging force created by the blown tire. If a driver brakes, the lateral steering force experienced by the vehicle is greater and the driver must provide more steering input to maintain control of the vehicle. If the driver provides too much steering input, he or she will have to try to correct the direction of the vehicle and may oversteer. When the vehicle has a high, rearward center of gravity, as a loaded 15-passenger van does, the rapid changes in steering direction can lead to instability and rollover. A similar driver reaction to a blowout in a passenger car is unlikely to have such severe consequences because the passenger car's lower center of gravity makes it more forgiving of inappropriate driver inputs.

Impressing upon 15-passenger van drivers the inherent dangers of operating these vehicles, particularly when fully loaded, and educating them about proper handling and control, particularly during emergency situations, can reduce the risk of rollover. Such training can also help dispel the expectation that these vans operate like large passenger cars. While the accident

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<sup>2</sup> T.A. Ranney, G. Heydinger, G. Watson, K. Salaani, E.N. Mazzae, and P. Grygier, *Investigation of Driver Reactions to Tread Separation Scenarios in the National Advanced Driving Simulator (NADS)*, DOT HS 809 523 (Washington, DC: National Highway Traffic Safety Administration, 2002).

drivers had experience operating the vans, they did not have experience with how the vehicles would respond in this type of emergency situation or other emergency situations or the consequences of their instinctive reactions to such situations. Educating drivers on how such vehicles respond to, and on the consequences of, different driver input could help operators approach 15-passenger van driving more cautiously.

In addition, training would provide a forum for educating drivers about the tire pressures and maintenance required for 15-passenger vans. The rear tires on a fully loaded van, for instance, must be inflated to 80 pounds per square inch, which is much higher than the rear tire pressure for most passenger cars. Stressing the importance of proper tire inflation during training will help drivers avoid potential problems. Drivers should also be taught to check the tires and tire pressure before driving the vehicle. In both these accidents, the tires were in very poor condition, which should have been readily apparent to someone who knew to look for cracks and rotting rubber.

Although NHTSA recommends that 15-passenger van drivers be trained to operate the vehicles, the agency does not provide information on the source of such training. The National Safety Council offers computer-based training, "Coaching the Van Driver," and many colleges and universities use this program to train their employees who drive vans. But this course does not educate drivers about emergency handling of the vans, nor does it discuss tire pressure and maintenance.

As NHTSA has acknowledged, 15-passenger van operators need training in the handling of those vehicles, and testing has demonstrated that controlling 15-passenger vans in a blowout is possible, albeit difficult, for a trained driver. The Safety Board concludes that safe operation of 15-passenger vans requires a knowledge and skill level different from and above that for passenger vehicles, particularly when the vans are fully loaded or drivers experience an emergency situation.

Therefore, the National Transportation Safety Board recommends that the American Automobile Association and the National Safety Council:

In cooperation with the National Highway Traffic Safety Administration, American Driver and Traffic Safety Education Association, General Motors Corporation, Ford Motor Company, and each other, develop a training program that incorporates the skills required for safe operation of 12- and 15-passenger vans and addresses the consequences of unsafe operation, including, but not limited to, operating in a fully loaded condition, emergency braking, high-speed lane changes, tire blowouts, and tire pressure and maintenance. (H-03-22)

The Safety Board also issued safety recommendations to the National Highway Traffic Safety Administration, the Federal Motor Carrier Safety Administration, the 50 States and the District of Columbia, the American Driver and Traffic Safety Education Association, the American Association of Motor Vehicle Administrators, Ford Motor Company, and General Motors Corporation. In your response to this letter, please refer to Safety Recommendation H-03-22. If you need additional information, you may call (202) 314-6177.

Chairman ENGLEMAN, Vice Chairman ROSENKER, and Members GOGLIA, CARMODY, and HEALING concurred in this recommendation.

By: Ellen G. Engleman  
Chairman