



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: September 13, 2002

In reply refer to: H-02-21

Mr. James M. Shannon
President and Chief Executive Officer
National Fire Protection Association
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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 organization 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 use of propane tanks on school buses. The recommendation is derived from the Safety Board's investigation of the May 31, 2001, collision between a truck-tractor semitrailer and a school bus near Mountainburg, Arkansas,¹ and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued eight safety recommendations, one of which is addressed to the National Fire Protection Association (NFPA). 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 31, 2001, about 3:28 p.m. central daylight time, a southbound Gayle Stuart Trucking, Inc., truck-tractor semitrailer exited Interstate 540 at State Highway 282 (SH-282) near Mountainburg. The driver was unable to stop at the stop sign at the bottom of the ramp. The 79,040-pound combination unit was traveling approximately 48 mph when it entered the intersection and collided with the right side of a westbound, 65-passenger, 1990 Blue Bird Corporation school bus operated by the Mountainburg, Arkansas, Public Schools. The school bus rotated approximately 300 degrees clockwise and overturned; the body, which partially separated from the chassis, came to rest on its right side on the eastbound shoulder of SH-282. The tractor semitrailer continued across the roadway, rotated about 60 degrees clockwise, overturned, and came to rest on its left side. Three school bus passengers seated across from the impact area were fatally injured; one was partially ejected. Two other passengers, one of whom was seated in the

¹ For additional information, read National Transportation Safety Board, *Collision Between Truck-Tractor Semitrailer and School Bus Near Mountainburg, Arkansas, on May 31, 2001*, Highway Accident Report NTSB/HAR-02/03 (Washington, DC: NTSB, 2002).

impact area, received serious injuries, and four passengers had minor injuries. The school bus driver and the truckdriver both sustained minor injuries.

The Safety Board determined that the probable cause of the accident was the truckdriver's inability to stop the tractor semitrailer at the stop sign at the bottom of the ramp due to the reduced braking efficiency of the truck's brakes, which had been poorly maintained and inadequately inspected. Contributing to the school bus passengers' injuries during the side impact were incomplete compartmentalization and the lack of energy-absorbing material on interior surfaces.

The school bus in the Mountainburg accident was equipped with a propane fuel system that was in use at the time of the collision. The tractor semitrailer struck the bus just inches aft of the propane tank. While it has not made specific recommendations addressing retrofitted propane tanks on school buses, the Safety Board has previously recommended protecting fuel tanks on school buses to minimize the risk of fire. On February 29, 1972, a 1961 sedan ran a stop sign near Reston, Virginia,² and collided with a school bus carrying four children. The impact ruptured the school bus fuel tank, knocked it from the bus, and disabled the school bus service door. A fire ensued in the sedan due to gasoline spilled from the ruptured and detached school bus fuel tank, which was in a vulnerable location and lacked crash protection design features. The Safety Board recommended that National Highway Traffic Safety Administration (NHTSA) and the Vehicle Equipment Safety Commission:

H-72-2

In consideration of the unnecessary hazards posed by locating school bus fuel tanks adjacent to service doors, act promptly to determine the "best" and "safest" location for school bus fuel tanks and to specify such location, as well as any protective shield or structural changes, to minimize the likelihood that a collision which might disable the service door or the emergency exit will also initiate a school bus fuel tank fire, and vice versa.

NHTSA replied that the rigorous side- and rear-impact barrier collision test requirements of Federal Motor Vehicle Safety Standard (FMVSS) 301 afforded a high level of protection for fuel systems on all vehicles up to 10,000 pounds gross vehicle weight rating. In addition, on September 19, 1974, the agency stated that a program to develop fuel system integrity tests for large school buses was planned. Such tests were later incorporated into FMVSS 301, and the Safety Board classified Safety Recommendation H-72-2 "Closed—Acceptable Action" on September 6, 1985.

On May 14, 1988, a pickup truck traveling north in the southbound lanes of Interstate 71 struck a southbound church activity bus head-on near Carrollton, Kentucky.³ The church bus fuel tank was punctured during the collision sequence and a fire ensued, engulfing the bus. The

² National Transportation Safety Board, *School Bus/Automobile Collision and Fire Near Reston, Virginia, on February 29, 1972*, Highway Accident Report NTSB/HAR-72/02 (Washington, DC: NTSB, 1972).

³ National Transportation Safety Board, *Pickup Truck/Church Activity Bus Head-on Collision and Fire Near Carrollton, Kentucky, on May 14, 1988*, Highway Accident Report NTSB/HAR-89/01 (Washington, DC: NTSB, 1989).

busdriver and 26 bus passengers were fatally injured, 34 passengers received minor to serious injuries, and 6 passengers were not injured. As a result of its investigation of this accident, the Safety Board recommended that NHTSA:

H-89-6

Revise Federal Motor Vehicle Safety Standard 301 to provide additional protection for school buses in severe crash situations based on an evaluation of the merits of relocating fuel tanks, providing additional structure to protect fuel system components, and frangible valves in critical locations.

NHTSA replied on August 16, 1989, enclosing copies of an advance notice of proposed rulemaking to make the crash standards more stringent. In an April 11, 1991, letter, NHTSA stated that responses to the advance notice of proposed rulemaking did not provide clear direction for proposing changes to FMVSS 301. Thus, for the next step, NHTSA said it was considering several options, including a research program to develop the technical information necessary to evaluate ways to improve the fuel system integrity of buses. On October 20, 1995, NHTSA reported that those commenting on the advance notice of proposed rulemaking agreed that FMVSS 301 was adequate and that manufacturers generally comply with the requirements by adding a cage around the fuel tank. The Safety Board classified Safety Recommendation H-89-6 “Closed—Acceptable Action” on May 15, 1996, citing its understanding that school bus manufacturers generally comply with stringent regulatory crash test requirements for large school bus fuel systems by adding a cage around the fuel tank.

These safety recommendations, issued over the past 3 decades, encouraged NHTSA and the school bus manufacturers to make fuel tanks on school buses safer. However, none of NHTSA’s fuel tank safety requirements for school buses apply to propane tanks.

The propane tank, which had been retrofitted on the accident school bus, was installed in accordance with NFPA Standard 58, ‘Standard for the Storage and Handling of Liquefied Petroleum Gases.’ The Safety Board is concerned that this standard does not adequately protect propane systems during a crash. Unlike gasoline and compressed natural gas systems, which are fitted onto school buses by the manufacturer, propane and other retrofitted fuel systems are not required to meet NHTSA crash test standards specified in FMVSSs 301 and 303. These standards require that gasoline and compressed natural gas systems mounted on a vehicle withstand a barrier crash test. Propane systems must pass no such test, and NHTSA cannot even regulate propane tank testing because propane tanks are aftermarket installations and therefore not subject to NHTSA safety standards. Most States (Idaho is the only exception) require that propane systems meet NFPA standards. While propane systems must have a discharge valve, this valve will not prevent a fire from occurring during a severe crash if the fuel system is compromised.

To further protect gasoline and diesel fuel tanks on school buses from being compromised, school bus manufacturers place them within a cage, even though not required to do so. In fact, a rigid safety cage enclosed the manufacturer-installed fuel tank on the accident school bus. The propane tank did not have such protection. As discussed above, the Safety Board has investigated school bus crashes in which cages did not enclose fuel tanks, and severe fires and loss of life ensued. The Safety Board concludes that catastrophic fires involving vehicles

equipped with propane tanks could happen because these tanks are not protected from collision and, thus, could rupture if struck.

Therefore, the National Transportation Safety Board recommends that the National Fire Protection Association:

Amend National Fire Protection Association Standard 58, Storage and Handling of Liquefied Petroleum Gas, to require that (1) propane fuel systems installed in school buses be protected and (2) propane fuel systems meet the equivalent to Federal Motor Vehicle Safety Standard 301 crash protection standards. (H-02-21)

The Safety Board also issued safety recommendations to the Federal Motor Carrier Safety Administration, National Highway Traffic Safety Administration, Commercial Vehicle Safety Alliance, and spring brake manufacturers and reiterated a recommendation to the U.S. Department of Transportation. In your response to the recommendation in this letter, please refer to H-02-21. If you need additional information, you may call (202) 314-6177.

Chairman BLAKEY, Vice Chairman CARMODY, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

By: Marion C. Blakey
Chairman