



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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**Date:** February 15, 2006

**In reply refer to:** H-06-11

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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 company 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 maintaining air brakes equipped with automatic slack adjusters (ASAs). The recommendation is derived from the Safety Board's investigation of the collision between a Ford dump truck and four passenger cars in Glen Rock, Pennsylvania, that took place on April 11, 2003, and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued 11 safety recommendations, 1 of which is addressed to publishers of National Institute for Automotive Service Excellence (ASE) certification test study guides. 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.

About 3:36 p.m., eastern daylight time, on April 11, 2003, in the Borough of Glen Rock, Pennsylvania, a 1995 Ford dump truck owned and operated by Blossom Valley Farms, Inc., was traveling southbound on Church Street, a two-lane, two-way residential street with a steep downgrade, when the driver found that he was unable to stop the truck. The truck struck four passenger cars, which were stopped at the intersection of Church and Main Streets, and pushed them into the intersection. One of the vehicles struck three pedestrians (a 9-year-old boy, a 7-

year-old boy, and a 7-year-old girl), who were on the sidewalk on the west side of Church Street. The truck continued across the intersection, through a gas station parking lot, and over a set of railroad tracks before coming to rest about 300 feet south of the intersection. As a result of the collision, the driver and an 11-year-old occupant of one of the passenger cars received fatal injuries, and the three pedestrians who were struck received minor-to-serious injuries. The six remaining passenger car occupants and the truck driver were not injured.<sup>1</sup>

The National Transportation Safety Board determines that the probable cause of this accident was the lack of oversight by Blossom Valley Farms, Inc., which resulted in an untrained driver improperly operating an overloaded, air brake-equipped vehicle with inadequately maintained brakes. Contributing to the accident was the misdiagnosis of the truck's underlying brake problems by mechanics involved with the truck's maintenance; also contributing was a lack of readily available and accurate information about automatic slack adjusters and inadequate warnings about the safety problems caused by manually adjusting them.

With respect to maintaining air brakes equipped with ASAs, the Safety Board noted that the majority of heavy trucks on the road are equipped with ASAs. All air-braked vehicles manufactured after 1994 are required to have them and, in 1992, the Safety Board found that about 65 percent of the vehicles inspected during the *Heavy Vehicle Airbrake Performance* safety study<sup>2</sup> were already equipped with ASAs. These safety devices were introduced without a concentrated education effort being employed.

The postaccident inspection of the Glen Rock accident truck revealed that the two rear axle brakes were out of adjustment and produced little or no braking force. The front axle air chambers, which were slightly more than half the size of the rear chambers, were in proper adjustment. Yet, because the larger T-30 rear brakes produced little or no braking force, excessive strain was placed on the significantly smaller T-16 front brakes, which caused them to quickly overheat, resulting in severely diminished truck braking capability.

The truck was equipped with Gunitite ASAs on all four brakes. After the accident, when the two rear adjusters were tested at the Gunitite facility with the worn "quick-connect" clevises and clevis pins from the accident truck, the pushrod stroke would not go below 2 1/2 inches, which is outside the adjustment limits, rendering the system incapable of producing braking force. However, when the ASAs were tested with new clevises and clevis pins, they functioned properly and the adjustment stayed well under 2 inches, which is within the adjustment limits and would provide adequate braking forces. Therefore, the Safety Board concludes that at the time of the accident, the ASAs for all four of the accident truck's brakes were capable of working properly; however, the quick-connect clevises and clevis pins for both rear brakes were worn to the extent that they prevented the ASAs from properly adjusting the brakes, thereby reducing the capability of the rear brakes.

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<sup>1</sup> For additional information, read National Transportation Safety Board, *Collision Between a Ford Dump Truck and Four Passenger Cars, Glen Rock, Pennsylvania, April 11, 2003*, Highway Accident Report NTSB/HAR-06/01 (Washington, DC: NTSB, 2006).

<sup>2</sup> National Transportation Safety Board, *Heavy Vehicle Airbrake Performance*, Safety Study NTSB/SS-92/01 (Washington, DC: NTSB, 1992).

The Safety Board reviewed the maintenance and inspection history of the accident truck, which had undergone four vehicle inspections between 2001 and the April 2003 accident—three Pennsylvania State annual inspections (August 2001, March 2002, and January 2003) and one roadside inspection (April 2002). During two of these inspections—the 2002 roadside inspection and the 2003 State annual inspection—the rear brakes were found to be out of adjustment. After the 2002 roadside inspection, when the accident truck was placed out of service for out-of-adjustment brakes, the driver of the vehicle, who was also a truck mechanic, manually adjusted the ASAs. The Safety Board could find no record of further examination of the brakes by the company or the mechanic to discover why the brakes had been out of adjustment. During the 2003 State annual inspection, a Ford dealership mechanic found the rear brakes to be out of adjustment, and he manually adjusted the ASAs. In an interview with Safety Board investigators, he said he had adjusted the brakes and thought he had fixed the problem. Had he performed a more in-depth examination of the brake system, he probably would have found and replaced the worn clevises and clevis pins, which would have enabled the ASAs to adjust the brakes properly and might have prevented the accident.

The Gunitite service manual gives specific instructions on how to conduct a torque test by turning the adjustment nut. If the Ford dealership mechanic had done a torque test, he might have realized that the adjuster itself was working properly. In addition, the Gunitite service manual indicates that mechanics should “check the foundation brake for proper function; worn cam bushings, pins and rollers, broken springs, worn quick-connect clevis, worn clevis bushings and clevis pins. Repair as necessary and repeat the function test.”<sup>3</sup>

One reason that ASAs should not be manually adjusted is that every time the adjusting nut is turned in a counterclockwise direction, the internal components experience additional wear because the action abrades the internal adjusting mechanism. In the El Cerrito, California, brake loss accident (also addressed in the Glen Rock accident report), the driver stated that he manually adjusted the slack adjusters twice a week and had done so on the morning of the accident. Postaccident testing of the El Cerrito accident truck at the Gunitite factory showed that three of the adjusting clutches were worn to the point that they could not hold an adjustment, probably due to their age and the deterioration caused by frequent manual adjustment. For the majority of ASAs, regular manual adjustment will cause premature wearing of the internal clutch, which is a necessary component for the automatic adjustment feature to work properly.

Various brake component problems can cause a pushrod stroke to go beyond the limits for producing adequate braking capability, causing the brakes to be out of service. These problems include, but are not limited to, worn cam bushings, worn or broken pins and rollers, broken springs, worn clevises (both quick-connect and standard), and worn clevis bushings and pins. When a driver or mechanic finds a pushrod stroke to be long and manually adjusts an ASA to correct the long stroke, he or she is masking the true problem with the brake, not fixing it. In all likelihood, the adjustment will be temporary. ASA manufacturers Gunitite, Haldex, and Bendix indicated to Safety Board investigators that they do not know how long (how many brake applications) a manually adjusted ASA will hold an adjustment.

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<sup>3</sup> Gunitite *Automatic Slack Adjuster Service Manual*, ASA 100-1 (Gunitite Corporation, June 1994) 7.

The drivers and mechanics who manually adjusted the ASAs on the trucks involved in the Glen Rock and El Cerrito accidents apparently did not understand that they were not fixing the underlying problem with the braking systems. They did not appreciate that when an ASA does not hold an adjustment, something is wrong with the adjuster itself or with some other foundation brake component. Therefore, the Safety Board concludes that the drivers and mechanics who manually adjusted the ASAs on the trucks involved in the Glen Rock and El Cerrito accidents did not look for underlying problems with the adjusters or related foundation brake components; consequently, they misdiagnosed the brake problems, probably because they were not properly educated on the function and care of ASAs and how they relate to foundation brake systems.

Manually adjusting ASAs to fix an out-of-adjustment brake is a dangerous practice that can have serious consequences. If an ASA is manually adjusted, the operator may wrongly assume the adjustment has “fixed” the braking problem, which gives the operator a false sense of security about the effectiveness of the braking system. The operator may believe that the brakes are fully reliable, when in fact they can go out of adjustment at any time, particularly in the case of vehicles that operate in hilly or mountainous environments. As the Glen Rock and El Cerrito accidents demonstrate, manually adjusting ASAs can create a situation in which brakes will not be capable of responding properly when they are desperately needed.

Although the Commercial Vehicle Safety Alliance’s Operation Air Brake data indicate that trucks with ASAs are placed out of service for out-of-adjustment brakes only half as frequently as those with brakes that have manual adjusters, ASA-equipped trucks are still being placed out of service for this deficiency, which suggests that ASAs have not solved the problem of out-of-adjustment brakes. Lack of knowledge about ASAs is one reason for the continuing problem. Since the Glen Rock and El Cerrito accidents, Safety Board investigators have questioned a number of randomly selected mechanics on the practice of manually adjusting ASAs. The majority indicated that they manually adjust ASAs when they are out of adjustment, a practice that ASA manufacturers neither suggest nor endorse.

In addition, results of the driver survey conducted in 2000 by the Owner-Operator Independent Drivers Association<sup>4</sup> showed that a majority of drivers, particularly owner-operators, are performing brake adjustments on both manual slack adjusters and ASAs. The 2003 Operation Air Brake driver survey showed that about half of the drivers responding believed that ASAs never go out of adjustment and about one-third thought that a driver with proper tools could readjust ASAs. The Safety Board therefore concludes that the warnings in existing materials available to owners, drivers, mechanics, and inspectors of air-braked vehicles equipped with ASAs have not been successful in communicating the inherent dangers of manually adjusting ASAs to correct out-of-adjustment brakes.

The ASE certifies brake repair and service professionals who maintain trucks, and its medium-heavy truck tests include test T4 for brakes. Given the widespread lack of awareness of the problems associated with manually adjusting ASAs in the trucking industry, the ASE should emphasize the risks associated with manually adjusting ASAs in its testing materials. As far as

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<sup>4</sup> Rick Craig, “The Driver Perspective,” *Report of Proceedings of the North American Brake Safety Conference, September 15-16, 2000* (Toronto, Canada: CVSA, 2001).

the Safety Board can determine, the T4 certification test does not currently address the manual adjustment of ASAs. The Safety Board has recommended that the ASE include the following information in its T4 brake certification testing materials: manually adjusting ASAs is dangerous and should not be done, except during installation or in an emergency to move the vehicle to a repair facility, because manual adjustment of this brake component (1) fails to address the true reason why the brakes are not maintaining adjustment, giving the operator a false sense of security about the effectiveness of the brakes, which are likely to go out of adjustment again soon, and (2) causes abnormal wear to the internal adjusting mechanism for most ASAs, which may lead to failure of this brake component.

The ASE does not publish study guides or manuals on its certification tests, but several companies, including your firm, do publish such guides. The Safety Board's examination of several private study guides for the ASE's medium-heavy truck T4 brake test showed that they inadequately cover the maintenance of ASA-equipped brakes, and some contain incorrect information. One study guide wrongly states, "Automatic slack adjusters may require periodic adjustment." Many mechanics use the study guides as a source of general maintenance information, as well as for test preparation, making it imperative that these guides contain thorough and accurate information about ASAs.

Therefore, the National Transportation Safety Board makes the following safety recommendation to publishers of National Institute for Automotive Service Excellence certification test study guides:

Include the following information in your National Institute for Automotive Service Excellence study guides: manually adjusting automatic slack adjusters is dangerous and should not be done, except during installation or in an emergency to move the vehicle to a repair facility, because manual adjustment of this brake component (1) fails to address the true reason why the brakes are not maintaining adjustment, giving the operator a false sense of security about the effectiveness of the brakes, which are likely to go out of adjustment again soon, and (2) causes abnormal wear to the internal adjusting mechanism for most automatic slack adjusters, which may lead to failure of this brake component. (H-06-11)

The Safety Board also issued safety recommendations to the Federal Motor Carrier Safety Administration, the District of Columbia and the States, the Commercial Vehicle Safety Alliance, manufacturers and marketers of automatic slack adjusters, manufacturers of vehicles equipped with air brakes, and the National Institute for Automotive Service Excellence. In your response to the recommendation in this letter, please refer to Safety Recommendation H-06-11. If you need additional information, you may call (202) 314-6177.

Acting Chairman ROSENKER and Members ENGLEMAN CONNERS, HERSMAN, and HIGGINS concurred in this recommendation.

*[Original Signed]*

By: Mark V. Rosenker  
Acting Chairman