

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: March 15, 1974

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Forwarded to:

Honorable Norbert T. Tiemann  
Administrator  
Federal Highway Administration  
400 Seventh Street, S. W.  
Washington, D. C. 20590  
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} SAFETY RECOMMENDATION(S)  
H-74-1 through 3

During the investigation of two recent tractor-semitrailer accidents, the National Transportation Safety Board has discovered a serious safety problem in the maintenance operation for the replacement of tractor-tandem equalizer beam bushings. We believe that this problem should be brought to the attention of all commercial motor vehicle owners and maintenance personnel.

Both accidents were the direct result of the failure of the tractor-tandem suspension equalizer beam. In each accident, failure occurred after maintenance personnel used a cutting torch to cut the worn bushings from the equalizer beams while they were preparing to install new bushings. The cutting torch produced cavities in the parent material of the equalizer beam, which created stress raisers through which failure occurred.

The first accident involved a fully loaded gasoline tanker. As a result of the accident, the vehicle was destroyed by fire and the driver was burned to death. The second accident involved a loaded dump truck (tractor-semitrailer) which struck a tree, jackknifed, and overturned. The driver survived. In both accidents the tractor-semitrailer suddenly, and without warning, went out of control and overturned.

In both accidents, loss of control resulted from the failure of the left-side tandem suspension equalizer beam. Both failures occurred through one of the three bushing holes. The alignment of the tractor-tandem drive axles depends upon the structural integrity of the equalizer beams. (See Photograph 1.) In each accident, when the beam failed, the rear axle rotated rearward on the left side, which caused the tractor to steer uncontrollably toward the right.

Inspection of the equalizer beams from both of the tractors revealed cavities in the surface of the equalizer beam bushing holes. These cavities were oriented in a groove-like alinement, roughly parallel to the axis of

the holes. (See Photographs 2 and 3.) Metallurgical examination of the failed bushing holes confirmed that the cavities in the surface of the parent material resulted from use of a cutting torch. Since the other bushing holes had similar cavities, it is concluded that a cutting torch had been used to remove the old bushings. The cavities in the parent material created stress raisers which initiated the failure of the equalizer beam. After this inappropriate maintenance, the tractors were returned to use. At the time of each accident, cold weather and impact loadings, caused by minor road surface depressions, contributed to the failure of the equalizer beams.

According to the suspension manufacturer, about 500,000 vehicles are equipped with similar suspensions. Vehicle and suspension manufacturers publish maintenance manuals and issue bulletins which describe the proper procedure for removing and installing equalizer beam bushings. The manuals and bulletins specify the use of suitable presses and do not suggest the use of flame-type cutting torches.

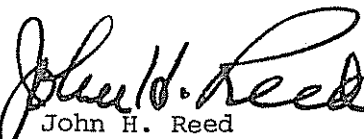
It is important to emphasize that the circumstances associated with these two accidents must be considered only as examples of what can happen as a result of unorthodox maintenance and repair practices. The important lesson to be learned by these accidents is that the improper use of cutting torches created stress raisers which adversely affected the strength characteristics of the equalizer beam. Furthermore, it should also be noted that the indiscriminate application of heat to any heat-treated vehicle component, whether by cutting torch, by welding, or by heating in an oven, can reduce strength characteristics or can cause the component to fail, even without the occurrence of cavities.

The Safety Board has no reason to believe that the suspensions involved in the two accidents were inadequate components, until they were exposed to damage by cutting torches. However, because of the large number of these suspensions in use, and because of the strong probability that other vehicle maintenance personnel are cutting the old bushings out of the equalizer beams with cutting torches, the National Transportation Safety Board recommends that the Federal Highway Administration disseminate throughout the motor carrier industry the following recommendations:

1. All commercial-motor-vehicle maintenance and repair personnel:
  - (a) Not use cutting torches to remove equalizer beam bushings. (Recommendation H-74-1)
  - (b) Follow the instructions in the maintenance manuals and bulletins provided by the equipment manufacturers and use appropriate mechanical devices (presses, pullers, etc.) when removing and installing all bushings and bearings. (Recommendation H-74-2)

2. All commercial-motor-vehicle operators review their past maintenance records to determine if there has been any bushing or bearing removal and replacement, and thoroughly examine those components to ascertain if they have been heated, if cavities have been produced, or otherwise damaged by a cutting torch, and if so, replace any components which have been subjected to a cutting torch.  
(Recommendation H-74-3)

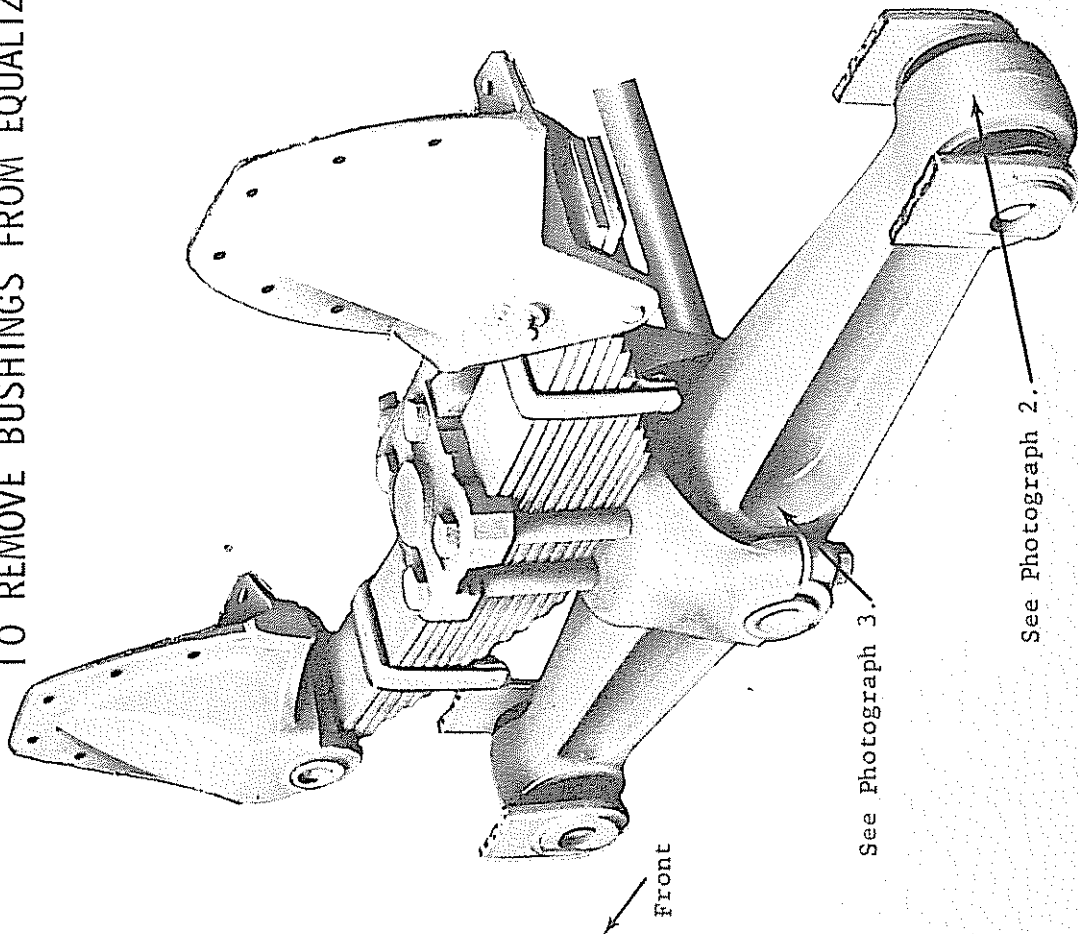
REED, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.

  
By John H. Reed  
Chairman

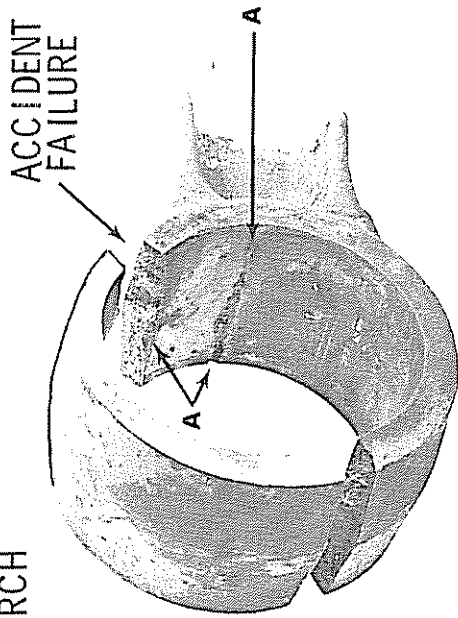
Enclosure:

cc: Secretary DOT  
American Trucking Association  
International Harvester Company  
Hendrickson Manufacturing Company

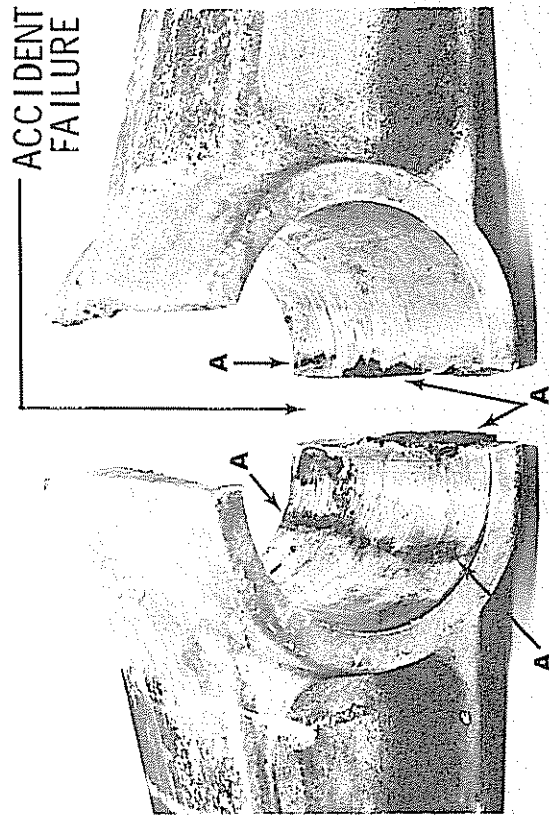
CATASTROPHIC FAILURES DUE TO USE OF CUTTING TORCH  
TO REMOVE BUSHINGS FROM EQUALIZER BEAMS



Photograph 1. Typical equalizer beam installation.



Photograph 2. Equalizer beam rear attachment point - (Braintree accident).



Photograph 3. Equalizer beam center attachment point - (Dunstable accident).

NOTE: Arrows on Photographs 2 and 3 indicate location of cutting torch induced cavities