

Log R-76 Not 1814 Reg. R-76-20 thru 22

**NATIONAL TRANSPORTATION SAFETY BOARD**  
**WASHINGTON, D.C.**

ISSUED: July 5, 1976

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Forwarded to:

Honorable Asaph H. Hall  
Administrator  
Federal Railroad Administration  
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

R-76-20 through 22

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About 12:50 p.m. on October 1, 1975, 1 locomotive unit and 11 cars of Amtrak train No. 315 derailed on the Louisville and Nashville Railroad Company's track near Pulaski, Tennessee. Of the 69 persons on the train, 31 were injured. Property and equipment damage amounted to about \$1,067,000. 1/

Both the railroad industry and the Federal Railroad Administration have studied track-train dynamics. The manufacturers of the six-wheel truck present a substantial amount of test data which indicates, in theory, that the performance of the six-wheel trucks is superior to that of four-wheel trucks in some instances and that the reactive forces generated by the two are nearly the same for all cases except for that of a lateral force. They admit that a six-wheel truck generates more lateral force than does a four-wheel truck, but they claim that the force is still below that which is required to overturn a rail or to cause a wheel to climb up on the rail. Since the forces required to overturn a rail or to cause a car wheel to climb out of the gauge have been determined to be a relationship between lateral forces (L) and vertical forces (V), the manufacturers have established L/V ratios as criteria for forces required for rail overturn

1/ For more detailed information on this accident read "Railroad Accident Report--Derailment of Amtrak Train on Louisville and Nashville Railroad, Pulaski, Tennessee, October 1, 1975." NTSB-RAR-76-6.

or for wheel climb. In order for a rail to overturn, the L/V ratio has to exceed 0.5 or 0.6 and in order for a wheel to climb the rail, the L/V ratio has to exceed 0.9. Tests show that the L/V ratio for an SDP-40-F locomotive is well below these values. Therefore, the concensus among the manufacturers is that the amount of lateral force generated is not the only factor which causes a rail to overturn. The manufacturers believe that the duration of lateral load is also a factor. An L/V ratio of 0.5 or 0.6 generally will not cause a rail to overturn unless the high ratio is maintained for a period of time. Curvature of the rails may also be a factor; the problem of rails being overturned by six-wheel trucks seems to be more evident in curves with a curvature greater than 2°. Since there are unknown factors involved, possibly the tolerance in track geometry as outlined by the Track Safety Standards allows too much variance to accommodate the six-wheel truck locomotives.

The evacuation of passengers from passenger equipment which is not upright becomes more complicated as the degree of inclination increases. Cars which are on their sides undoubtedly present the most difficult situation. Interior items including curtains should be restrained. The sliding doors that require upward movement to open them should be configured to open either way during an emergency, and there should be means readily available to open them. Facilities should be provided to permit undisedabled passengers to exit from the car at the vestibule. This would mean that passengers in the car would have to move parallel to the floor across open doorways and brush past curtains when the car is on its side. These needs could be met by providing handholds or footrests at critical points and by attaching rungs in the vestibule or providing ladders for that purpose. Also, emergency forces along a rail route should have knowledge of how to enter passenger equipment quickly. Their lack of knowledge on how to open doors, how to remove windows on the car, its interior arrangement, and how the car is structured may hamper rescue efforts.

Therefore, the National Transportation Safety Board recommends that the Federal Railroad Administration:

Review the Federal Track Safety Standards to determine if their current requirements are adequate for the safe accommodation of the six-wheel truck locomotives.  
(R-76-20) (Class II, Priority Followup)

(3)

Require that rail passenger equipment be fitted with roof hatches so that passengers can escape through the ceiling of a car which is lying on its side. (R-76-21) (Class II, Priority Followup)

Require that Amtrak or the railroad operating an Amtrak train disseminate information to emergency units along the route on emergency entry techniques and on where emergency equipment within the car is located. (R-76-22) (Class II, Priority Followup)

TODD, Chairman, McADAMS, HOGUE, BURGESS, and HALEY, MEMBERS, concurred in the above recommendations.

A handwritten signature in cursive script, appearing to read "Webster B. Todd, Jr.", written in dark ink.

By: Webster B. Todd, Jr.  
Chairman