

Log R-443A

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 21, 1984

Forwarded to:

Mr. W. H. Dempsey
President & Chief Executive Officer
Association of American Railroads
1920 L Street, N.W.
Washington, D.C. 20036

SAFETY RECOMMENDATION(S)

R-84-6 and -7

On May 6, 1983, one locomotive and 33 cars of Burlington Northern freight train CTB derailed near Hallet, Oklahoma. The freight train, which consisted of five locomotive units and 129 cars, was traveling about 32 miles per hour at the time of derailment. The initial derailment occurred when the locomotive units passed over a pair of broken track joint bars on the entrance spiral of a 2° right-hand curve in a 1-percent ascending grade. Examination of the track joint bars indicated that they had been broken before the accident. One axle of the fourth locomotive unit and car Nos. 1 through 18 derailed, causing an undesired emergency application of the brakes. This derailment was followed by three secondary derailments within the train involving car Nos. 39 through 44, Nos. 69 through 76, and No. 104. The total damage was estimated at \$388,000. There were no injuries or fatalities.

The Safety Board's investigation revealed the following placement of cars in the train: 36 heavy cars at the front of the train with an average weight of 86 tons per car, 72 light cars in the center of the train with an average weight of 38 tons per car, and 21 heavy cars at the rear of the train with an average weight of 115 tons per car. The average car weight for the entire train was 68 tons per car. Eighteen of the 21 cars at the end of the train had a gross weight in excess of 100 tons per car. Only one of the 72 center cars had a gross weight in excess of 100 tons per car. All three secondary derailments, involving a total of 15 cars, occurred in the lightweight, center portion of the train and contributed to the increased severity of the accident. These cars derailed as a result of excessive longitudinal forces created by the emergency brake application at the front of the train and the forward momentum of the 21 heavy cars at the rear of the train.

The Safety Board is becoming increasingly concerned about the adverse effect of the improper placement of heavily loaded cars behind empty cars in trains on the severity of train accidents. In a derailment on the Missouri Pacific Railroad on July 25, 1981, near Jacksonville, Texas, 26 cars of the 46-car train derailed causing a total of \$512,000 in damage. The initial derailment occurred at car No. 16; however, 13 of the 15 cars ahead of this car derailed due to the dynamic effects on the 7 empty cars next to the locomotive. Five of the first 15 cars which derailed were hazardous materials cars. In a derailment on the Illinois Central Gulf Railroad on September 28, 1982, near Livingston, Louisiana, 43 cars of the 101-car train derailed causing a total of over \$12 million in

damage. After an emergency brake application from a parted air hose, two empty gondolas located near the head end of the train jackknifed and initiated the general pileup of cars. Thirty-six of the 37 derailed cars behind the empty gondolas were loaded, and approximately one-half of the derailed cars contained hazardous materials.

The research conducted by the Association of American Railroads, the Federal Railroad Administration, and the Railway Progress Institute in the AAR/FRA/RPI Track Train Dynamics program has been in process for over 10 years. The program has achieved great technical advances in identifying the dynamic relationships between track and equipment. The program also has resulted in guidelines for train makeup, train handling, and engineer training. One of the principal train handling guidelines is that train longitudinal forces when stopping can be reduced if the heaviest cars are placed closest to the locomotive.

The Safety Board believes that with some frequency railroads are unnecessarily endangering the lives of crewmembers and the general public by the improper distribution of loaded and empty cars in trains. The Safety Board also believes that the railroads are not taking full advantage of the guidelines for train makeup, train handling, and engineer training developed under the AAR/FRA/RPI Track Train Dynamics program to prevent severe or catastrophic accidents. This situation is due, in part, to inherent conflicts between the manner in which railroad operations are conducted and the requirements of the guidelines. An advisory group should be constituted to explore the problem areas and to develop a methodology for the practical application of the guidelines on railroad operations.

Therefore, the National Transportation Safety Board recommends that the Association of American Railroads:

Advise its members of the consequences of improper distribution of loaded and empty cars in trains as illustrated by the derailment on the Missouri Pacific Railroad on July 25, 1981, near Jacksonville, Texas; the derailment on the Illinois Central Gulf Railroad on September 28, 1982, near Livingston, Louisiana; and the derailment on the Burlington Northern Railroad on May 6, 1983, near Hallet, Oklahoma. (Class II, Priority Action) (R-84-6)

Form an Advisory Committee to develop a methodology for the practical application in railroad operations of the guidelines on train makeup, train handling, and engineer training developed in the joint Association of American Railroads, Federal Railroad Administration, Railway Progress Institute Track Train Dynamics program. (Class III, Longer-Term Action) (R-84-7)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY and ENGEN, Members, concurred in these recommendations. GROSE, Member, did not participate.


By: Jim Burnett
Chairman