

LS R-443

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 21, 1984

Forwarded to:

Mr. R. C. Grayson
Chairman & Chief Executive Officer
Burlington Northern Railroad Company
176 East Fifth Street
St. Paul, Minnesota 55101

SAFETY RECOMMENDATION(S)
R-84-4 and -5

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.

Guidelines developed as a result of the joint Association of American Railroads, Federal Railroad Administration, and Railway Progress Institute Track Train Dynamics program prescribe the proper placement of heavy cars in trains in order to reduce the longitudinal forces that may occur when a train is being stopped. According to these guidelines, the heaviest cars should be placed as close to the locomotive as possible. The Safety Board believes that had the heaviest cars in freight train CTB been placed in the front of the train, the series of derailments that occurred following the initial derailment might have been avoided or at least minimized. Had the accident involved the release of hazardous materials in a populated area, the consequences could have been much more severe and possibly catastrophic.

If it is not possible to make up a train to conform with track/train dynamics guidelines, the engineer should be informed. When an engineer is informed that train makeup does not conform with track/train dynamics guidelines, the engineer can reduce speed, discontinue use of dynamic braking, apply air brakes while power is still being used, and generally insure that the train is under control when approaching curves, bridges, and crossovers. Instructions on the proper compensation procedures should be issued by the railroad through the engineer's supervisor.

Therefore, the National Transportation Safety Board recommends that the Burlington Northern Railroad Company:

Issue instructions which embody the guidelines of the Association of American Railroads, the Federal Railroad Administration, and the Railway Progress Institute Track Train Dynamics program for train makeup to those personnel who are involved in the makeup of trains and provide training in the instructions. (Class II, Priority Action) (R-84-4)

In situations where train makeup does not conform with the guidelines of the Association of American Railroads, the Federal Railroad Administration, and the Railway Progress Institute Track Train Dynamics program, advise train engineers so that they can take compensating action in handling the train. (Class II, Priority Action) (R-84-5)

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

By: 
Chairman