

Log R-456A

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 22, 1983

Forwarded to:

Honorable John Riley
Administrator
Federal Railroad Administration
400 Seventh Street, S.W.
Washington, D.C.

SAFETY RECOMMENDATION(S)

R-83-102

About 3:55 a.m., c.s.t., on April 13, 1983, Burlington Northern Railroad Company (BN) freight train 64TT085 (64T85) (Extra 5086 West), while moving about 47 mph, struck the rear of standing BN freight train 43JJ005 (43J05) (Extra 5089 West) at Pacific Junction, Iowa. Four locomotive units and eight cars of train 64T85 and the caboose and seven cars of train 43J05 were derailed. The accident occurred about 2 miles within the yard limits at Pacific Junction. There was no flag protection provided by the standing train, and none was required by BN operating rules. There was no fire, and no hazardous materials were involved. The engineer of train 64T85 was killed, and the head brakeman, conductor, and rear brakeman were injured. The engineer, head brakeman, conductor, and rear brakeman of train 43J05 were injured. Damage was estimated to be \$972,000. 1/

The head brakeman of train 64T85 said that, when the train passed Bartlett, Iowa, he left the operating compartment of the locomotive to go down into the nose of the lead locomotive unit. He said that, at that time, he had not observed a caboose marker on any train ahead, he had not observed either the advance or yard limit boards for the yard at Pacific Junction, and he had not heard any radio communication from train 43J05 crewmembers or anyone else, nor did he so thereafter upon his return to the operating compartment. He said that when he started back up the steps from the nose to reenter the operating compartment, he heard the engineer use an expletive in a manner that denoted surprise. Immediately thereafter, train 64T85 struck the rear of train 43J05.

According to the rear crewmen of train 43J05, train 64T85 struck the rear of standing train 43J05 under power, without sounding a warning whistle, and without dimming its headlight. The positions of the locomotive controls at the time of the accident could not be accurately determined. However, the speed of train 64T85 at the time of collision was determined to be 47 mph. After train 64T85 passed the yard limit sign, more than 2 miles from the caboose of train 43J05, the engineer should have operated train 64T85, according to BN operating rule 93, at a speed that would have enabled train 64T85 to stop short of the caboose of train 43J05. An alert engineer and head brakeman could have perceived the yard limit sign and the lighted red marker on the caboose of the standing train. Reasonable use of the train brakes by the engineer had he sighted either in a timely manner would have stopped train 64T85 short of the caboose.

1/ For more detailed information read Railroad Accident Report—"Rear End Collision Of Two Burlington Northern Railroad Company Freight Trains, Pacific Junction, Iowa, April 13, 1983" (NTSB/RAR-83/09).

There was no evidence to establish conclusively whether the head end and rear end crews were alert after train 64T85 passed Bartlett. None of the slow orders held by train 64T85 would have required the engineer to reduce the train's speed north of Hamburg, Iowa, so there is no check available from that source to determine his state of alertness. However, the engineer was not heard on the radio, either initiating or acknowledging a radio call, after the train passed Hamburg. Moreover, immediately before the collision, the rear end crew of train 43J05 could see no activity in the cab. There were no radio calls initiated or acknowledged by the rear end crew of train 64T85. Even if the engineer of train 64T85 became aware of the standing train seconds before the collision, as suggested by the head brakeman, it was not in time for him to react effectively.

The vital components of the brake system of the lead locomotive unit of train 64T85 worked properly during tests. Therefore, the Safety Board concludes that the brakes were in proper operating condition and that the train could have been stopped in about 1,200 feet by an emergency application of the train's brakes as a last resort. This was verified by computer simulation and mathematical computations. The lead locomotive unit was not equipped with either a deadman foot pedal or an alerting device. Either of these safety devices, especially the alerting device, might have prevented the accident. A deadman foot pedal must be depressed at all times when the locomotive is in operation. If the foot pedal is released at any time after the brakepipe has been charged, the brakes will apply and stop the train. However, in practice the function of the foot pedal can be defeated easily so that the engineer does not have to keep a foot on the pedal at all times. For this reason, the railroad industry, in general, is removing the deadman foot pedal device which is not required equipment in Federal Railroad Administration (FRA) regulations. Alerting devices operate on a different principle, their essential feature being that they require that the engineer make some physical movement within an average time of about 22 seconds. If the alerting device detects no movement within the prescribed time, a warning tone will sound for about 6 seconds. If there is no acknowledgment within this time, the train brakes will be applied automatically, and the train will be stopped.

As a result of its investigation of a train accident at Herndon, Pennsylvania, on March 12, 1972, 2/ the Safety Board recommended on March 14, 1973, that the FRA, in cooperation with the Association of American Railroads:

Develop a fail-safe device to stop a train in the event that the engineer becomes incapacitated by sickness or death, or falls asleep. Regulations should be promulgated to require installation, use and maintenance of such a device. (R-73-8)

The recommendation was reiterated in a report the Safety Board issued following its investigation of a train collision at Indio, California, on June 25, 1973. 3/ All of the FRA's responses to Safety Recommendation R-73-8 have rejected the need for such development.

In a response letter from the FRA dated December 24, 1980, the FRA pointed out that on November 27, 1978, the FRA issued a request for proposal for a research locomotive and train handling evaluator to be utilized in examining the many problems encountered by operating personnel within the locomotive cab. The letter also

2/ Railroad Accident Report--"Head-On Collision of Two Penn Central Freight Trains, Herndon, Pennsylvania, April 12, 1972" (NTSB-RAR-73-3).

3/ Railroad Accident Report--"Rear-End Collision of Two Southern Pacific Transportation Company Freight Trains, Indio, California, June 25, 1973" (NTSB-RAR-74-1).

acknowledged that currently there are devices available which will stop a train in the event the engineer becomes incapacitated for any reason. The research locomotive has been built and currently is being used by the Illinois Institute of Technology for experimental work. The FRA stated that it would not be able to accurately evaluate the need for regulatory action (concerning an alerting device) until an evaluation process is completed. Safety Recommendation R-73-8 is currently classified by the Safety Board as "Open--Unacceptable Action." The Safety Board urges the FRA to expedite the action initiated in response to Safety Recommendation R-73-8 and to issue regulations that will require alerting devices on locomotives operating on main tracks. The FRA also should consider the imposition of monetary penalties on persons responsible for nullifying alerting devices.

The operating compartment of the lead locomotive unit of train 64T85 was overridden by the caboose of train 43J05 when the trains collided. The operating compartment was crushed and distorted, especially on the engineer's side. The engineer's seat was ejected from the operating compartment. The engineer's body was found 255 feet north of the point of impact. No bodily evidence such as blood was found in the operating compartment to indicate any presence of the engineer or head brakeman in the compartment during its deformation. The engineer apparently was killed when he either jumped or was ejected from the operating compartment. A person in the operating compartment could have survived the collision only by lying on the floor as the head brakeman apparently did. Had the head brakeman been in the fireman's seat, he would not have survived.


In general, when a locomotive strikes a caboose or a light freight car, the caboose or car overrides the locomotive operating compartment, frequently with devastating results. Locomotive operating compartments are not designed structurally to withstand medium to high-speed impacts. The crewmembers on a locomotive frequently are faced with the dilemma "do I jump or ride it out" when there is an impending collision. Jumping is risky even at slow speeds because of the danger posed by striking unyielding objects and by derailling equipment. If the operating compartment provided a higher degree of protection, the best action might be to "ride it out." In this accident, since the head brakeman survived the collision and the collapse of the operating compartment, the Safety Board believes that the FRA should initiate and/or support a design study to provide a protected area in the locomotive operating compartment for the crew when a collision is unavoidable.

Although the FRA has studied the crashworthiness of locomotives and much data have been developed, including publication of a report, "Analysis of Locomotive Cabs," in 1982, no significant changes in the crashworthiness design standards for locomotives have been recommended by the FRA or voluntarily adopted by the railroad industry. The Safety Board urges the FRA to expeditiously address those issues dealing with the crashworthiness of locomotive operating compartments and similar studies related to crashworthiness of passenger-carrying equipment, and move to see that the industry makes use of data and that guidelines are developed.

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

Initiate and/or support a design study to provide a protected area in the locomotive operating compartment for the crew when a collision is unavoidable. (Class II, Priority Action) (R-83-102)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and McADAMS and BURSLEY, Members, concurred in this recommendation. ENGEN, Member, did not participate.


By: Jim Burnett
Chairman