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

ISSUED: June 24, 1985

Forwarded to:
Mr. William H. Dempsey
President
Association of American Railroads
1920 L Street, N.W.
Washington, D.C. 20036

SAFETY RECOMMENDATION(S)

R-85-62 and - 63

About 4:00 a.m. mountain standard time on April 3, 1983, a Denver and Rio Grande Western Railroad Company (D&RGW) switch crew was switching 17 cars in the D&RGW's North Yard at Denver, Colorado, when a coupler broke on the fourth car, leading to an undetected separation of 150 feet between the third and fourth cars. The engineer, responding to a hand lamp signal from the foreman, accelerated the locomotive, with a caboose, an empty freight car, and a loaded tank car coupled ahead. The loaded tank car struck the fourth car at a speed of about 10-12 mph. Upon impact, the end sill of the fourth car, an empty boxcar, rode over the coupler of the loaded tank car and punctured the tank head. Nitric acid spilled from the car, formed a vapor cloud which dispersed over the area, and ignited small fires involving the crossties. As a result 34 persons were injured and 9,000 persons were evacuated from the area. Damage to railroad property was estimated to be about $341,000. 1/

The tank car (GATX 27006) had the top shelf broken off of the A end (north end) coupler as a result of the overriding by the box car. The bottom half of the tank head on the A end was punctured inward. The head had separated beginning about 6 inches from the bottom of the tank; the separation was 24 inches long with an opening 4 1/2 inches wide. There were two small punctures in the tank. The end running board and coupler attachments were bent and broken.

Car GATX 27006 was an uninsulated aluminum fusion-welded tank car. It was 56 feet 3 inches long and had a capacity of 17,187 gallons. The car was built in December 1971 and carries a Department of Transportation (DOT) Classification, DOT-111A60ALW1. It was equipped with AAR type F shelf couplers. The car was not equipped with headshields or thermal protection.

The empty box car (WP 66132) was found after the accident with the truck 5 feet off center. The A end (south end) center sill, draft gear pocket, and coupler carrier iron were bent and broken from impact; the A end E-type coupler was missing and was found

1/ For more information see, Railroad Accident Report--"Denver & Rio Grande Western Railroad Company Yard Accident Involving Punctured Tank Car, Nitric Acid Vapor Cloud and Evaucation, Denver, Colorado, April 3, 1983" (NTSB/RAR-85/10).

at the initial point of collision. The coupler had failed completely through its shank at the coupler pin hole and the fracture surfaces indicated a preexisting fracture of about 70 percent of the cross section. Wear on both couplers of the car was within limits prescribed by Federal Railroad Administration (FRA) Safety Standards.

Car WP 661322 was a 60-foot-long box car with a sliding center sill. The sliding sill underframe was capable of 20-inch travel in draft and buff. The car was built by Pacific Car and Foundry in October 1969. It was equipped with AAR type E couplers with long shanks. Repair records indicated the car was repaired by Atchison, Topeka and Santa Fe Railway Company (ATSF) at Barstow, California, on December 7, 1982. No repairs were made to the couplers at that time. The car received the last FRA required periodic inspection on July 7, 1979. The inspection required that the couplers be inspected at that time.

In 1980, in its revision of the freight car safety standards and subsequent to the foregoing inspection, the FRA eliminated the requirement for periodic inspections of freight cars. The periodic inspection requirements had required that the inspecting party remove the coupler pin retaining plate and examine the coupler in the coupler pin hole area.

Since the coupler of the empty box car had been drastically weakened by a pre-existing fracture, the continual quick accelerations and stops, necessary for the switching operation, stressed the weakened coupler and it failed completely. Because the broken coupler was still attached to the tank car coupler, it was pulled from the empty box car and the broken end fell to the track structure. This separated cut of cars apparently drifted away from the cars attached to the locomotive so that there was a separation of about 150 feet from the string of freight cars which was being pushed. Because of darkness and their location none of the crewmembers were in a position to see the separation and it went undetected.

Since the engine foreman and engineer were not aware of the separation, the next switching movement following the separation was made as though all the cars still were attached to the locomotive. Therefore, instead of all the cars moving when the engineer accelerated quickly, a rapid closing of the space that separated the cars led to a collision at a speed of about 12 mph. As a result of the impact, the empty box car, now without a coupler, overrode the tank car and struck the tank head, puncturing the tank shell with it's end sill.

Had the tank car been equipped with head shields, the end of the tank car probably would not have been punctured and the release of the material probably would not have occurred. Because the capability of the aluminum tank car to resist end puncture on impact has not been fully tested, the Research and Special Programs Administration (RSPA) in consultation with the FRA and AAR should subject the DOT 111 specification aluminum tank car to full testing and evaluation to determine what type of head shields are needed to protect the ends of aluminum tank cars. Thereafter RSPA should mandate their installation at an early date.

In the North Yard accident the top and bottom shelf coupler of the tank car was not able to prevent the empty box car from overriding and striking the tank end because the coupler of the box car had fallen out at the attachment to the car when the coupler failed at the pin hole. Since the pin attachment is not visible to a car inspector during routine inspections and because there is no federal regulation or industry practice requiring

periodic inspection of this portion of a coupler, it is possible that a car with a partially broken coupler at the pin hole will go undetected for a considerable length of time while the fracture progresses until a complete failure occurs, as it did in this accident. Moreover there are other car components that are not visible to an inspector during a routine inspection procedure; therefore, since the FRA has eliminated periodic inspection requirements, the AAR should, in cooperation with the railroads, incorporate in its interchange rules a requirement that hidden areas of a freight car be inspected periodically.

As a result of this investigation, the National Transportation Safety Board recommends that the Association of American Railroads:

> Seek agreement between member railroads to periodically inspect hidden car components in a manner at least equivalent to the requirements of the federal regulations which were in effect prior to the revision of the Freight Car Safety Standards in 1980 and incorporate this inspection as a rule in the car interchange requirements. (Class II, Priority Action) (R-85-62)
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> In consultation with the Federal Railroad Administration and the Research and Special Programs Administration conduct a full testing and evaluation program to develop a head shield to protect DOT specification aluminum tank car ends from puncture and incorporate installation of the head shield at an early date as a rule in the car interchange requirements. (Class II, Priority Action) (R-84-63)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

By: Jim Burnett
Chairman