RAILROAD ACCIDENT INVESTIGATION

REPORT NO. 4143

LOUISVILLE AND NASHVILLE RAILROAD COMPANY

CASKY, KY.

JANUARY 29, 1968

DEPARTMENT OF TRANSPORTATION

FEDERAL RAILROAD ADMINISTRATION

WASHINGTON, D. C. 20591

Summary

DATE:	January 29, 1968
RAILROAD:	Louisville and Nashville
LOCATION:	Casky, Ky
KIND OF ACCIDENT:	Derailment
TRAIN INVOLVED:	Passenger
TRAIN NUMBER:	704
LOCOMOTIVE NUMBERS:	Diesel-electric units 691, 780, 770
CONSIST:	15 cars
ESTIMATED SPEED:	65-67 m p h
OPERATION:	Signal indications
TRACK:	Single; tangent; 0 50 percent descending grade northward
WEATHER:	Raining
TIME:	1:29 a m
CASUALTIES:	25 injured
CAUSE:	Inadequately maintained track, and inadequacy of the spring and friction assemblies of the freight-type trucks of PRR 2333 to dampen sufficiently the lateral roll amplitude of that car as it moved over the inadequately maintained track
RECOMMENDATION:	That all railroads operating passenger trains hauling cars similar to PRR 2333 and equipped with freight-type trucks restrict the maximum speed of such trains to 60 m p h

DEPARTMENT OF TRANSPORTATION

FEDERAL RAILROAD ADMINISTRATION

RAILROAD SAFETY BOARD

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Synopsis

On January 29, 1968, a Louisville and Nashville passenger train derailed at Casky, Kentucky, resulting in injury to twenty-four passengers and one employee.

The accident was caused by inadequately maintained track, and inadequacy of the spring and friction assemblies of the freight-type trucks of PRR 2333 to dampen sufficiently the lateral roll amplitude of that car as it moved over the inadequately maintained track

Location and Method of Operation

The accident occurred on that part of the Evansville Division extending between Amqui, Tenn and Henderson, Ky , a distance of 133 8 miles In the accident area this is a single-track line over which trains operate by signal indications of a traffic control system

At Casky, Ky , 57 0 miles north of Amqui, a siding 1 4 miles in length parallels the main track on the east The north switch of the siding is 3,150 feet north of the station sign A spur track, hereafter referred to as the Phelps-Dodge spur track, diverges from the main track at a point 1 2 miles north of the north siding-switch The spur-track switch is trailing point for northbound movements

The initial derailment occurred on the main track, 3,101 feet north of the Casky station sign and 49 feet south of the north siding-switch. The general derailment occurred 1 2 miles farther northwaid, at the turnout of the Phelps-Dodge spur track

Track

The main track is tangent a considerable distance north and south of the derailment points The grade for northbound trains is 0 50 peicent descending 4,701 feet to the initial derailment point and a short distance northward

The structure of the main track in the derailment area consists of 132-pound rail, 39 feet in length, laid on an average of 22 treated ties to the rail length It is fully tie plated with double-shoulder tie plates, spiked with 2 rail-holding spikes per tie plate, and is provided with 6-hole, 36-inch joint bars and an average of 6 rail anchors per rail It is ballasted with slag and limestone to a depth of 12 inches below the ties

Time and Weather

The derailment occurred about 1:29 a m , under rainy weather conditions

Maximum Authorized Speed

The maximum authorized speed for passenger trains in the derailment area is 70 miles per hour

Circumstances Prior to Accident

No 704, a northbound first-class passenger train, consisted of 3 car-body type diesel-electric units, 1 box-express car, 1 baggage car, 1 box-express car, 1 refrigerator-express car, 2 baggage cars, 1 dormitory car, 2 coaches, 1 tavern-lounge car, 1 dining car, 2 coaches and 2 sleeping cars, in that order It left Amqui at 12:16 a m the day of the accident and left Guthrie, Ky , 39 0 miles north of Amqui, at 1:12 a m About 17 minutes later, the train neared Casky The engineer and fireman were in the control compartment at the front of the first diesel-electric unit The conductor, train baggageman, and flagman were at various locations in the cars The crew members said they had made observations of the train while en route from Amqui and that they had observed nothing unusual

The Accident

No 704 passed the Casky station sign about 1:29 a.m Soon afterward, while the train was moving northward on the main track at 65 to 67 miles per hour, as estimated by the engineer, the front pair of wheels of the front truck of the third car derailed 49 feet south of the north switch of the Casky siding The crew members were unaware of this derailment and the train continued northward at unreduced speed

The derailed pair of wheels then struck the curved closure rail of the Phelps-Dodge spur track turnout, resulting in derailment of the rear truck of the 3rd car, all trucks of the the 4th to 13th cars, inclusive, and the front wheels of the front truck of the 14th car None of the crew members was aware of anything being wrong before the train brakes applied in emergency as a result of the general derailment

Casualties

The train baggageman and 24 passengers were injured

Damages

The train stopped with the front end 2,896 feet north of the general derailment point The derailed cars stopped in various positions on or near the track structure, as shown in the sketch appended to this report The 3rd to 6th cars, inclusive, and the 9th and 10th cars were destroyed The 7th, 8th, 11th, 12th and 13th cars were heavily damaged, and the 14th car was slightly damaged

According to the carrier's estimate, the monetary damage to the derailed equipment, track structure, and signal equipment totaled $208,956

Train Crews Hours of Service

All the crew members, with the exception of the engineer, had been continuously on duty 2 hours 14 minutes at the time of the derailment, after having been off duty in excess of 20 hours The engineer had been on duty 8 hours 19 minutes in the aggregate, after having been off duty 28 hours 30 minutes

Post Accident Examination of Track Structure

Examination of the main track throughout a considerable distance south of the initial derailment point disclosed nothing which would indicate that dragging equipment or an obstruction on the track contributed to the accident However, it revealed that within a distance of 36 feet north and 24 feet south of the frog point of the north turnout of the Casky siding, 56 percent of the ties were in a deteriorated condition and 31 percent of the rail-holding spikes were raised and not adequately securing the base of the rails to the ties Track cross level measurements, under load, in the area of the initial derailment point disclosed variations up to one and three-eighths inches Within a distance of 23 feet, between points 40 and 17 feet south of the initial derailment point, the variation in cross levels was one inch * Other measurements in this area revealed that the track gage varied between 56½ and 57 inches, or up to ½ inch in excess of standard gage (56½ inches)

*It is generally accepted that the maximum permissable variation in cross levels for train speeds of 51 to 70 miles per hour is 3/4 inch in 31 feet

Examination revealed that the aforesaid track conditions in the derailment point area are not representative of the general condition of the main track in the territory involved

Marks of Derailment

The first mark was a wheel mark on the head of a spike on the gage side of the east rail of the main track, 49 feet south of the point of the north switch of the Casky siding. It indicated that a pair of wheels, apparently the front wheel of the front truck of the third car, had derailed to the west at this point Three feet north of the initial derailment point, flange marks appeared on a tie plate on the field side of the west rail These marks, caused by one of the derailed wheels, extended 1 2 miles northward on the ties to the curved closure rail of the Phelps-Dodge spur track turnout, where the general derailment occurred Northward from the general derailment point, the structure of the main track was destroyed for a distance of about 690 feet

Car PRR 2333

This car, the third car of No 704, was a freight-type box car of all-steel construction, built in 1929 It was 42 feet 3 inches long over strikers, and was equipped with steam and air signal lines for use as an express-box car in passenger train service Its stencilled light-weight, load limit and nominal capacity were, respectively, 51,000, 57,500 and 55,000 pounds The trucks were of the 4-wheel, spring-plank, freight type with 33-inch multiple-wear wrought steel wheels, 5½-inch by 10-inch journals, cast bolsters, and cast-steel side frames having integral journal boxes The trucks had a wheel base of 5 feet 6 inches and were spaced 32 feet 3 inches between their centers. Each truck side frame had a spring assembly consisting of 3 outer helical-coil springs with 3-11/16 inch travel, 1 inner helical-coil spring with 3-3/4 inch travel and a BL-5 Cardwell Westinghouse friction snubber

At the time of the derailment, the car was transporting cargo weighing 14,900 pounds

Post Accident Examination of Train Equipment

Examination of the train equipment disclosed nothing which could have contributed to the derailment, with the exception of the condition of the body-bolster side bearing at the northeast location (BL) of the third car, PRR 2333 This bearing has a normal length and width of 9-3/4 inches and 3-7/8 inches, respectively It was found worn and battered, from contact with its mate truck bolster bearing surface, to a concave configuration 10-11/16 inches in length and 3-7/8 inches in width. The mate truck bolster bearing was sheared off and could not be found after the derailment

Analysis of Accident

No 704 was moving at an estimated speed of 65-67 miles per hour as it approached the north turnout of the Casky siding and the third car, PRR 2333, apparently was rocking laterally to some extent at that time As the car moved over the main track in the turnout area, deflections of the inadequately maintained track structure in that area transmitted additional energy inputs into the car through the trucks The freight-type trucks had no stabilizing feature which would dampen the energy inputs Hence, these inputs increased the lateral roll amplitude of the car sufficiently to cause the flange of the front wheel on the west side of the front truck to rise above the west rail This permitted the mate wheel to drop inside the east rail 49 feet south of the turnout switch, and caused the west wheel to drop outside the west rail. The derailed wheels rolled northward on the ties to the turnout of the Phelps-Dodge spur track, where they struck the curved closure rail, resulting in the general derailment

In the past, several passenger train derailments involving cars similar to PRR 2333 and equipped with freight-type trucks have occurred under circumstances similar to those in this case Information relating to the derailments indicates that the trucks of the aforesaid cars were over-sprung and prone to derail due to inadequacy of the spring and friction snubber assemblies of the freight-type trucks to dampen sufficiently the lateral roll amplitude of the cars, when moving empty, or lightly loaded, in passenger trains traveling over unstable track at speeds in excess of 60 miles per hour Apparently recognizing the proneness of the cars to derail when moving empty at high speed, various railroads, including some regions of the railroad owning PRR 2333, have restricted passenger trains with cars of this type to a maximum speed of 60 miles per hour when such cars are empty Since these cars apparently are prone to derail when moving over unstable track at high speed under a light load, as in the instant case, it would be in the interest of safety if the aforesaid speed restriction were made applicable to passenger trains with lightly loaded cars similar to PRR 2333 Furthermore, it would be in the interest of safety if all other railroads operating passenger trains handling cars similar to PRR 2333 would restrict those trains to a maximum speed of 60 miles per hour, particularly in zones where the track structure is not maintained to a high standard

Findings

1 At the time of the derailment, the train was moving at 65-67 m p h and in accordance with applicable rules of the carrier

2 The track structure in the area of the north turnout of the Casky siding was unstable due to being inadequately maintained

3 The freight-type trucks of PRR 2333, the third car, had no stabilizing feature which would dampen lateral oscillations of the car

4 As the third car moved over the main track in the area of the north turnout of the Casky siding, deflections of the unstable track transmitted energy inputs to the car through the trucks

5 The spring and friction snubber assemblies of the freight-type trucks were unsatisfactory to properly damp the roll amplitude of the light loaded car as it traversed the unstable track Consequently, the lateral roll amplitude of the car increased to the extent that the flange of the front wheel on the west side of the front truck was caused to rise above the west rail, resulting in the derailment

Cause

The derailment was caused by inadequately maintained track, and inadequacy of the spring and friction assemblies of the freight-type trucks of PRR 2333 to dampen sufficiently the lateral roll amplitude of that car as it moved over the inadequately maintained track *

Recommendation

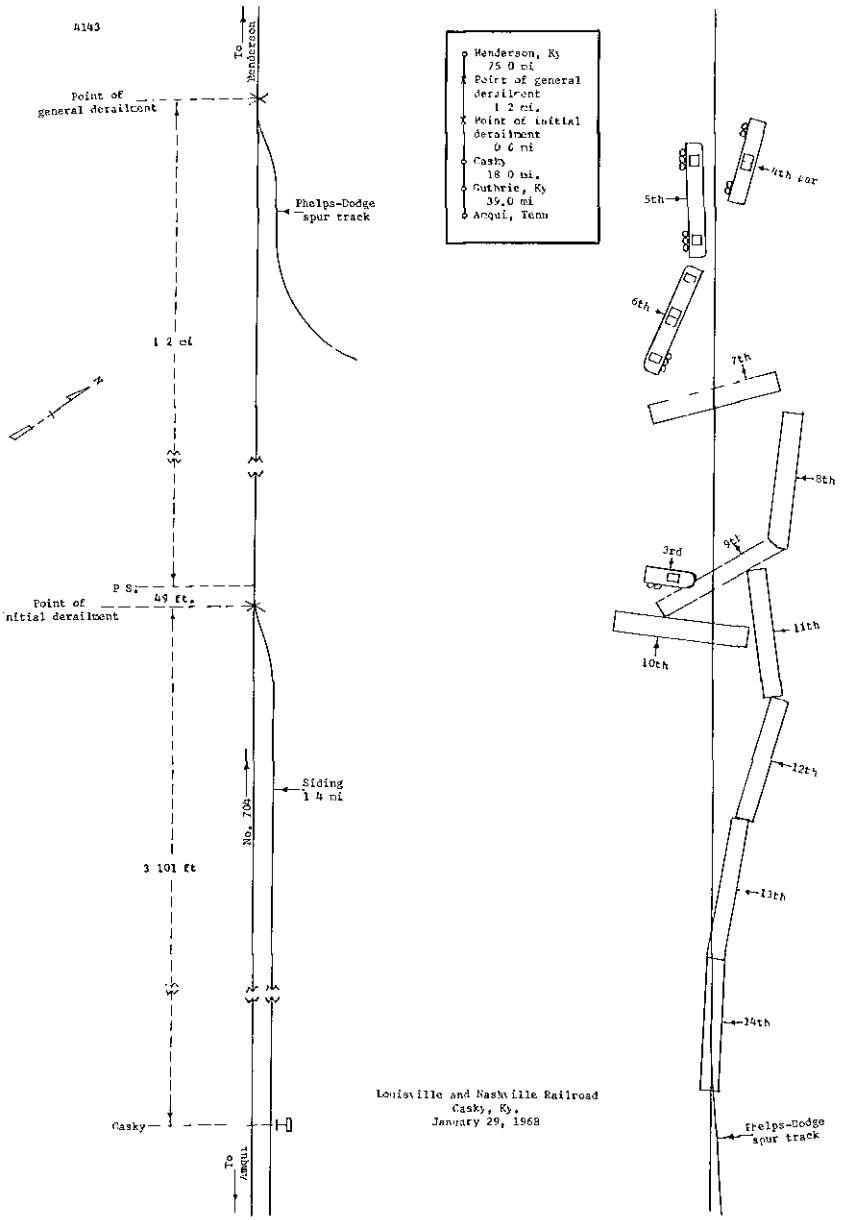
It is recommended that all railroads operating passenger trains hauling cars similar to PRR 2333 and equipped with freight-type trucks restrict the maximum speed of such trains to 60 m p h or less when the aforesaid cars are moving empty or lightly loaded, particularly in zones when the track structure is not maintained to a high standard It is further recommended that the spring-load ratio on this type of car should be reexamined and made more compatible with the lading weight carried by these cars

Dated at Washington, D C., this 27th, day of March 1969.
By the Federal Railroad Administration Railroad Safety Board

Bette E Holt
Acting Executive Secretary

(SEAL)

*The Federal Railroad Administration has no jurisdiction over railroad operating rules; track structures; bridges; rail-highway grade crossing protection; track clearances; consist of train crews; qualifications or physical condition of railroad employees; running and draft gear on cars, or the construction of cars except those appurtenances within jurisdiction of the Safety Appliance Acts and the Power Brake Law of 1958



Louisville and Nashville Railroad
Casky, Ky.
January 29, 1968