RAILROAD ACCIDENT INVESTIGATION

REPORT NO. 4141

NEW YORK CENTRAL RAILROAD COMPANY

COLD SPRINGS, OHIO

JANUARY 8, 1968

DEPARTMENT OF TRANSPORTATION

FEDERAL RAILROAD ADMINISTRATION

Washington, D. C. 20591

Summary

DATE:	January 8, 1968
RAILROAD:	New York Central
LOCATION:	Cold Springs, Ohio
KIND OF ACCIDENT:	Derailment
TRAIN INVOLVED:	Freight
TRAIN NUMBER:	Extra 1750 West
LOCOMOTIVE NUMBERS:	Diesel-electric units 1750, 5757, 5673, 1699
CONSIST:	83 cars, caboose
SPEED:	38 m p h
OPERATION:	Signal indications
TRACKS:	Double; 0°54' curve; 0 55 percent descending grade westward
WEATHER:	Clear
TIME:	1:24 a m
CASUALTIES:	1 killed; 4 injured
CAUSE:	Broken wheel

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Synopsis

On January 8, 1968, a New York Central Railroad freight train derailed near Cold Springs, Ohio, resulting in derailed equipment striking a nearby house. One occupant of the house was killed, and four other occupants were injured

The derailment was caused by a broken wheel, and was investigated in conjunction with representatives of the Public Utilities Commission of Ohio.*

*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 Appliances Act and the Power Brake Law of 1958.

Location and Method of Operation

The accident occurred on that part of the Ohio Central Division of the New York Central Railroad extending between Glen Echo and Dayton, Ohio, a distance of 27 7 miles In the accident area this is a double-track line over which trains of the New York Central Railroad and the Erie Lackawanna Railroad are jointly operated Trains moving with the current of traffic are operated by signal indications of an automatic block-signal system

From the north, the main tracks are designated as No 1 westward and No 2 eastward Track No 1 is owned and maintained by the Erie Lackawanna Railroad; track No 2 by the New York Central Railroad

The initial derailment occurred on track No 1, 9 8 miles west of Glen Echo and 1 0 mile west of Cold Springs The general derailment occurred on track No 1 about 328 feet west of the initial derailment point

In the derailment area, Wynn Road parallels track No 1 on the north at a distance of 40 feet between centerlines Several private residences are along the north side of the road, about 70 feet north of track No 1

Snyderville Road crosses tracks No. 1 and No. 2 at grade at the initial derailment point The crossing is surfaced with bituminous material and is about 35 feet wide

Time and Weather

The derailment took place about 1:24 a m , in clear weather The temperature was 12 degrees below zero

Track No. 1

From the east on track No. 1 there are, successively, a tangent 4,127 feet and a compound curve to the left, having a maximum curvature of 0°54', 438 feet to the initial derailment point and 1,245 feet westward The grade in this area is 0 55 percent descending westward

Authorized Train Speed

The maximum authorized speed for freight trains in the derailment area is 50 miles per hour

Circumstances Prior to Accident

Extra 1750 West, a westbound freight train consisting of 4 diesel-electric units, 83 cars and a caboose, left Bellefontaine, Ohio, about 23 miles east of Glen Echo, at 12:15 a m. the day of the accident The crew members said that they made frequent observations of the train while en route from Bellefontaine to the scene of the derailment, and that they had observed nothing unusual The crew members in the caboose further said that when the train passed three

points en route, including the Cold Springs interlocking station, they saw the operators at those points give hand signals which indicated that no defective condition of the train had been observed

As the train passed the Cold Springs interlocking station and approached the initial derailment point, the engineer, fireman and front brakeman were in the control compartment of the first diesel-electric unit The conductor and flagman were in the caboose

The Accident

Extra 1750 West passed Cold Springs at 1:22 a.m Approximately two minutes later, while it was moving westward on track No 1 at 38 miles per hour, as indicated by the speed-recording tape, the front pair of wheels of the rear truck of the 60th car derailed one mile west of Cold Springs Moments later, the rear pair of wheels of the truck also derailed, resulting in derailment of all trucks of the 60th to 68th cars, inclusive, and the front truck of the 69th car, about 328 feet west of the initial derailment point

The 61st car derailed to the north, overturned, slid across Wynn Road, and struck a one-story frame house located about 70 feet north of track No 1 and 100 feet west of the general derailment point. The 67th car, which remained upright, also crossed Wynn Road and struck the house A coal-fired heating stove within the house apparently overturned as a result of being struck by derailed equipment, setting the house on fire and causing an explosion when the contents of a propane household storage tank ignited

Casualties

The householder was killed, and his wife and three children were injured None of the train crew was injured

Damages

The train stopped with the front end 2,925 feet west of the general derailment point The 60th to 69th cars, inclusive, were derailed All the derailed cars, except the 61st car, stopped upright in various positions either on or near the structure of track No 1 or on or near Wynn Road The 61st car, which overturned, and the 67th car each stopped with one end on Wynn Road and the other end penetrating the house mentioned in the foregoing. The house was destroyed as a result of the impact and the subsequent fire and explosion. Of the derailed cars, three were destroyed and six were somewhat damaged One was not damaged.

Train Crew's Hours of Service

All the crew members of Extra 1750 West had been on duty 4 hours 24 minutes at the time of the accident, after having been off duty 33 hours or more.

Post-Accident Examination of Track Structure

Examination of the structure of track No 1 throughout a considerable distance east of the initial derailment point disclosed nothing which would indicate that dragging equipment, an obstruction on the track, or a defective track condition contributed to the accident

Post-Accident Examination of Train Equipment

Examination of the derailed equipment disclosed that the front wheel on the south side of the rear truck of the 60th car (NYC 43704) had broken into five or more pieces, as shown in the wheel print appended to this report Three of the broken off pieces (designated as 1, 2 and 3 in the wheel print) were recovered, at points 87, 201 and 249 feet west of the initial derailment point The other portions (designated as "A" and "B" in the wheel print) were not recovered

The rear truck of the 60th car separated from the car after the initial derailment It stopped on the north side of track No 1, 515 feet west of the initial derailment point It was found intact, except for the broken off pieces of the wheel involved That part of the broken wheel remaining on the axle showed nothing which would indicate that the wheel had been loose or that it had turned on the axle wheel seat

The three broken off pieces of the wheel recovered after the accident included all the flange of the wheel as well as the tread, rim and portions of the plate No unusual condition of the flange tread or rim was disclosed The rim thickness, and the flange height and width were well within limits of wear prescribed by the carrier and the Association of American Railroads

Broken Wheel

The wheel was of the one-wear wrought carbon steel type (AAR design A-33, Class U) manufactured by the Armco Steel Company in August 1961 Records indicate that it was mounted on the axle in September 1961, and the axle apparently was applied to NYC 43704, the 60th car of Extra 1750 West shortly afterward

Laboratory analysis of the wheel after the accident disclosed that the steel met the chemical requirements of AAR specification M-107 for wrought carbon steel wheels It further disclosed that a number of small oxidized areas appeared in the fractured surfaces of the wheel plate at locations indicated in the wheel print of this report, and that tooling discontinuities or flaws, including a lap-like discontinuity, residual to wheel rolling operations during manufacture appeared in these areas The exact location where the wheel began to fracture could not be determined However, it is apparent that the original fracture started on the inner plate surface, at one of the small oxidized areas, and progressed rather slowly around the hub This eventually weakened the plate structure to the extent that the

fracture then progressed rapidly around the hub, causing three radial fractures through the plate and rim, and resulting in complete failure of the wheel

Car NYC 43704

This car, the 60th of Extra 1750 West was an all-steel box car, built in October 1961 It was 51 feet 9-½ inches long over strikers, weighed 60,400 pounds, and had 4-wheel ASF Ride Control Trucks The rear truck, with respect to the direction the car was moving at the time of the accident, had one-wear wrought carbon steel wheels, 33 inches in diameter, and 5-½ inch by 10-inch friction journals The truck centers were 40 feet 10 inches apart The wheel base of each truck was 5 feet 6 inches At the time of the accident, the car was transporting a cargo of copper wire weighing 30,045 pounds

After the car was loaded with copper wire, it was inspected at various points by car inspectors of the New York Central Railroad None of these inspectors noticed or observed any defective condition of the car

Marks of Derailment

The first mark was a batter mark across the top of the head of the south rail of track No 1, about 12 feet east of the east edge of the Snyderville Road crossing Approximately 10 feet farther westward, a scrape mark extended along the top of a joint bar on the gage side of the south rail Immediately west of the joint bar, the gage side of the head of the south rail bore a heavy gouge mark about three inches long The foregoing marks evidently were made by the broken wheel, the front wheel on the south side of the rear truck of the 60th car in the train

Approximately two feet west of the heavy gouge mark, scuff marks appeared on the surface of the Snyderville Road crossing, at the east side of the crossing and adjacent to the field side of the south rail These marks apparently were caused by the front of the south side frame of the rear truck of the 60th car dropping sufficiently after the wheel broke to contact the crossing surface Also at the east side of the crossing, a flange mark appeared on the crossing surface adjacent to the gage side of the north rail, indicating that the mate wheel of the broken wheel derailed at this point, the initial derailment point The scuff and flange marks extended westward throughout the width of the crossing At the west edge of the crossing, the aforesaid marks were heavier and wider, apparently as a result of the rear pair of wheels of the rear truck of the 60th car derailing at this point

Beginning at the west edge of the crossing and on the gage side of the north rail, flange marks, apparently caused by the derailed wheels on the north side of the truck, extended about 110 feet diagonally southwestward to the gage side of the south rail Between this point and the general derailment point, a distance of 175 feet, no derailment marks were

found on the track structure. Between those points, the ground surface along the south side of the structure of track No 1 bore heavy wide scrape marks which apparently were caused by the underframe at the rear of the 60th car From all indications, the derailed truck separated from the car when it struck the gage side of the south rail, permitting the underframe at the rear of the car to drop to the ground along the south side of the track structure

Beginning at the general derailment point and extending 135 feet westward, the structure of track No 1 was destroyed or heavily damaged

Analysis of Accident

At the time of the initial derailment, Extra 1750 West was proceeding westward on track No 1 in accordance with applicable rules and regulations of the carrier The train equipment had previously been subjected to visual inspections by the carrier's car inspectors and no defective condition of the 60th car had been detected At the times of these inspections, the plate surface of the front wheel on the south side of the rear truck of the 60th car apparently had one or more small cracks or fractures, which had probably been present for a considerable length of time The cracks or fractures, however, were not susceptible to detection by the car inspectors' visual inspections, due to accumulation of oil and road dirt on the wheel plate and to the inspectors' view of the wheel being partially obstructed by the journal box and related equipment In addition, it was virtually impossible for the crew members of the train to detect the defective condition of the aforesaid wheel when they made observations of the train en route from Bellefontaine Thus, for the aforesaid reasons, the defective condition of the wheel remained undetected prior to the derailment

At some point in time before the derailment, the condition of one or more of the small cracks or fractures in the wheel plate worsened to the extent that the plate began to fracture circularly around the hub As this fracture progressed, weakening of the wheel-plate structure ensued While the train was traversing the Snyderville Road crossing about one mile west of Cold Springs, the wheel plate weakened to the extent that the aforesaid fracture then progressed rapidly around the hub, causing three radial fractures to occur rapidly through the wheel plate and rim This resulted in complete failure of the wheel at a point a few feet east of the Snyderville Road crossing causing the initial and general derailments

The wheel failed as a result of tooling discontinuities or flaws residual to wheel rolling operations during manufacture by the Armco Steel Company in August 1961 These irregularities may not have been visible to ordinary visual inspections conducted by Armco Steel Company employees after manufacture, or by New York Central Railroad Company employees prior to mounting the wheel on the axle On the other hand, they might have been visible and detected had the wheel been

examined after manufacture in accordance with that part of the AAR Manual of Standards and Recommended practices reading as follows:

15 Finish ***

(c) Wheels shall be given a thorough surface examination and gaging at the place of manufacture before being offered for inspection They shall have a workmanlike finish and must be free from defects liable to develop in or cause removal from service.

In any event, it is evident that the wheel involved was manufactured with several tooling discontinuities in the plate, and that the inspections made after manufacture were not thorough enough to disclose these irregularities. Tooling discontinuities can act as stress risers which may eventually lead to wheel failures such as occurred in this case Consequently, it is imperative in the interest of railroad safety that the Armco Steel Company and other wheel manufacturers review their quality control measures at appropriate intervals, to ensure that proper wheel rolling practices are being followed and that wheels supplied railroad carriers are free of defects which might ultimately result in wheel failures. It is further imperative that a wheel be thoroughly and carefully inspected by a responsible employee of the carrier's shop or car department before it is mounted on an axle, to determine whether it has any defective condition which might lead to ultimate failure.

Findings

1. At the time of the initial derailment, the train was proceeding westward in accordance with applicable rules and regulations of the carrier

2 The derailment was caused by a broken wheel on the 60th car

3 The wheel broke in the plate due to tooling discontinuities or flaws residual from wheel rolling operations in manufacture

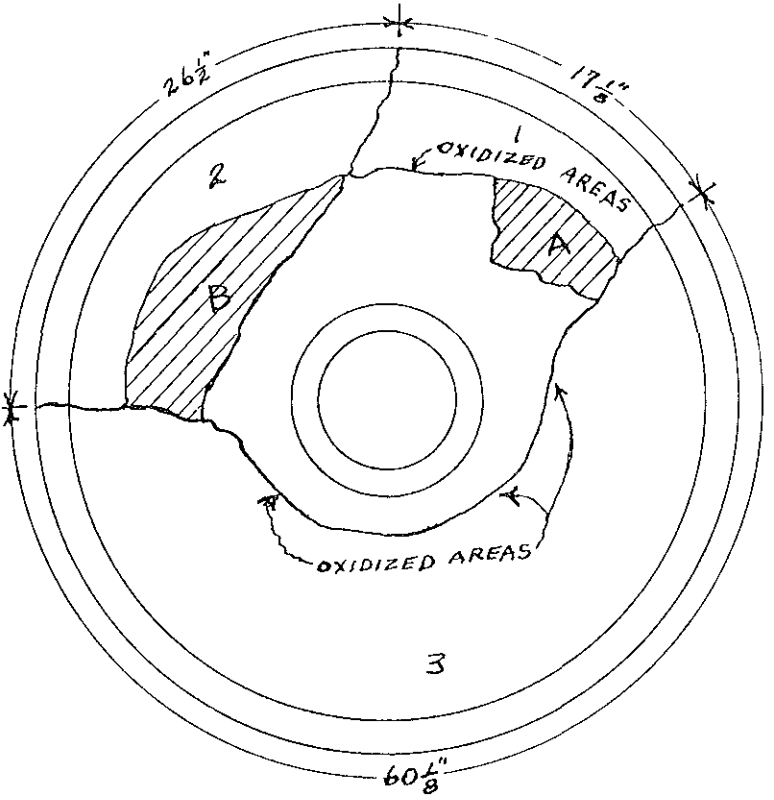
Cause

This accident was caused by a broken wheel.

Dated at Washington, D C., this 12th day of December 1968.
By the Federal Railroad Administration,
Railroad Safety Board

Bette E Holt
Acting Executive Secretary

(SEAL)



Broken Wheel of 60th Car

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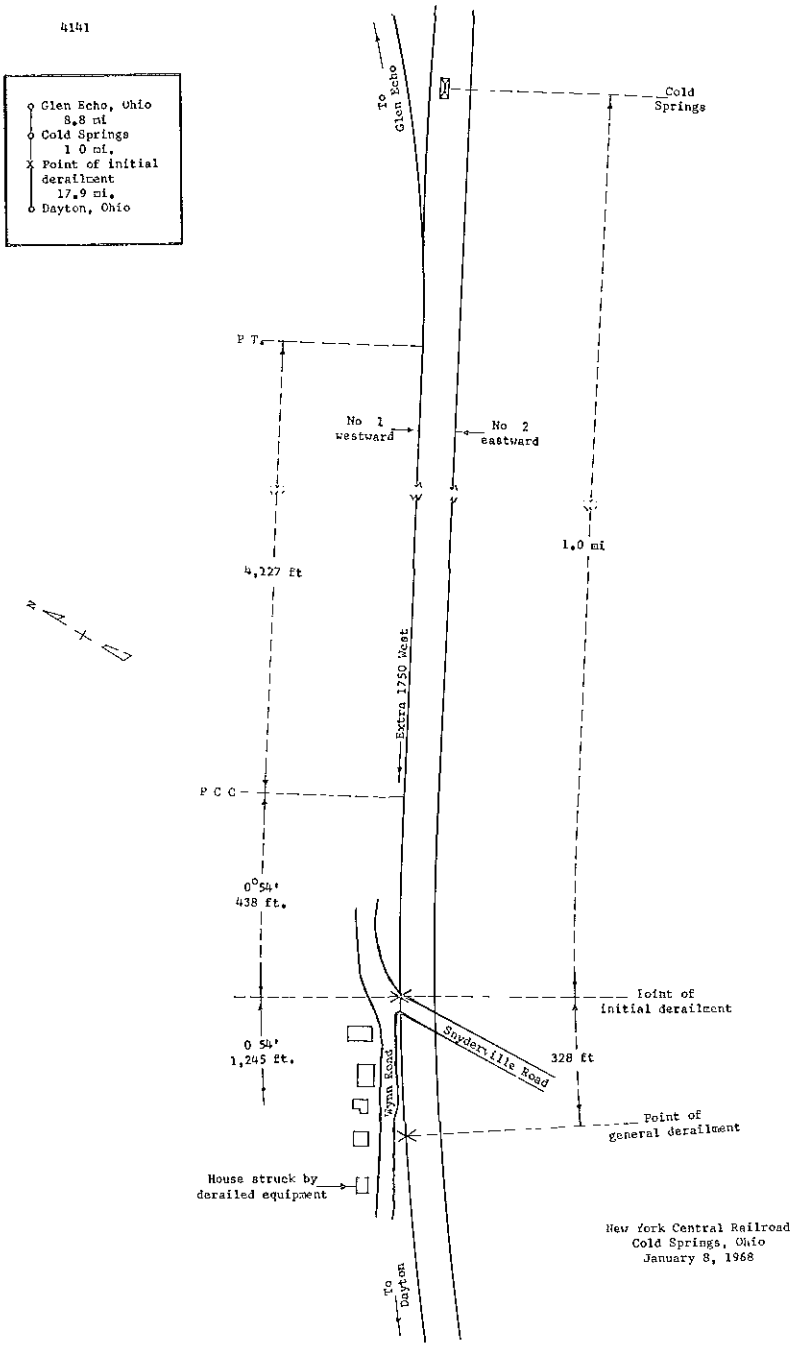
Glen Echo, Ohio
8.8 mi
Cold Springs
1.0 mi.
Point of initial derailment
17.9 mi.
Dayton, Ohio
To Glen Echo
Cold Springs
P T
No 1 westward
No 2 eastward
1.0 mi
4,227 ft
Extra 1750 West
P C C
0°54'
438 ft.
Point of initial derailment
0 54'
1,245 ft.
Snyderville Road
328 ft
Tyma Road
Point of general derailment
House struck by derailed equipment
To Dayton
New York Central Railroad
Cold Springs, Ohio
January 8, 1968