

INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 3209

THE ATCHISON, TOPEKA AND SANTA FE
RAILWAY COMPANY

REPORT IN RE ACCIDENT

NEAR MANSFIELD, KANS., ON

OCTOBER 21, 1948

SUMMARY

Railroad: Atchison, Topeka and Santa Fe
Date: October 21, 1948
Location: Mansfield, Kans.
Kind of accident: Derailment
Train involved: Passenger
Train number: 4
Engine number: Diesel-electric units
53, 53B and 53A
Consist: 12 cars
Speed: 78 m. p. h.
Operation: Timetable, train orders and
automatic block-signal system
Track: Single; 0°30' curve; level
Weather: Clear
Time: 7:42 a. m.
Casualties: 16 injured
Cause: Broken rail

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3209

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

December 29, 1948

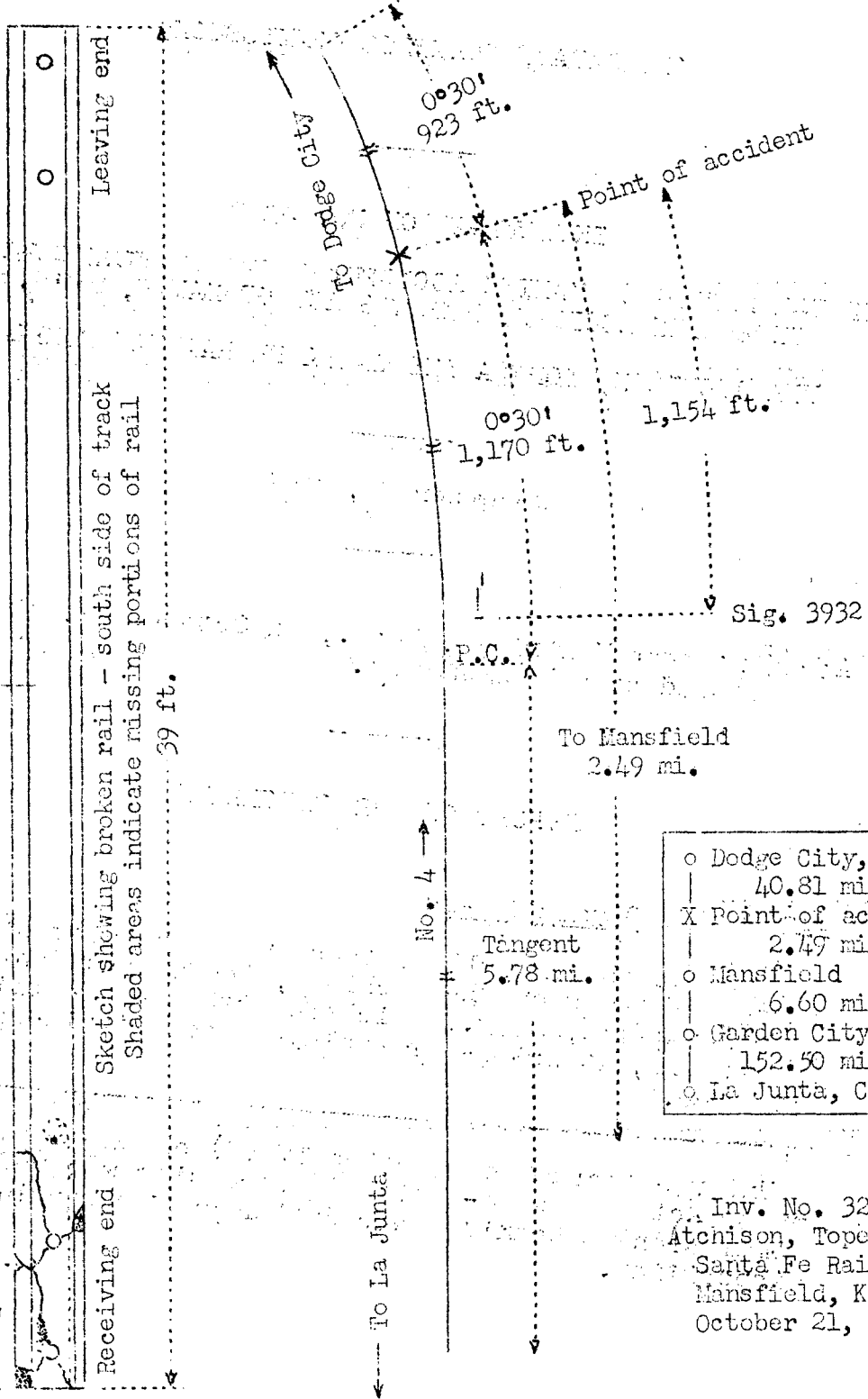
Accident near Mansfield, Kans., on October 21, 1948,
caused by a broken rail.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On October 21, 1948, there was a derailment of a passenger train on the Atchison, Topeka and Santa Fe Railway near Mansfield, Kans., which resulted in the injury of 14 passengers, 1 dining-car employee and 1 train-service employee.

¹ Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



o	Dodge City, Kans.	40.81 mi.
X	Point of accident	2.49 mi.
o	Mansfield	6.60 mi.
o	Garden City, Kans.	152.50 mi.
o	La Junta, Colo.	

Inv. No. 3209
 Atchison, Topeka and
 Santa Fe Railway
 Mansfield, Kans.
 October 21, 1948

Break #2
 6-21/32"
 Break #1
 6-27/32"

Receiving end
 Leaving end

To La Junta

No. 4

To Dodge City

To Mansfield
 2.49 mi.

P.C.

Sig. 3932

Tangent
 5.78 mi.

0°30'
 923 ft.

0°30'
 1,170 ft.

1,154 ft.

39 ft.

Location of Accident and Method of Operation

This accident occurred on that part of the Colorado Division extending between La Junta, Colo., and Dodge City, Kans., 202.4 miles. In the vicinity of the point of accident this is a single-track line, over which trains are operated by timetable, train orders and an automatic block-signal system. The accident occurred on the main track at a point 161.59 miles east of La Junta and 2.49 miles east of Mansfield. From the west the main track is tangent 5.78 miles, then there is a 0°30' curve to the left 1,170 feet to the point of accident and 925 feet eastward. The grade is level.

On the curve on which the accident occurred the track is laid on a fill about 4 feet in height. The structure of the track consists of 110-pound rails, 39 feet in length, laid in 1928 on an average of 24 treated ties per rail length. It is fully tieplated with single-shoulder tieplates, single-spiked, provided with 4-hole 26-inch 100-percent joint bars and an average of 10 rail anchors per rail length. It is ballasted with crushed rock and slag to a depth of 17 inches below the ties. At the point of accident the curvature was 0°30', the gage was 4 feet 3-5/8 inches, and the superelevation was 2-3/4 inches.

Automatic signal 3932, governing east-bound movements, is 1,154 feet west of the point of accident.

Rules of the maintenance-of-way department read in part as follows:

SECTION FOREMEN.

65. Inspect Section Daily.--They, or one or more of their reliable men, must pass over their entire section every day (Sundays and holidays included) unless relieved therefrom by Roadmaster.

They must keep a sharp lookout for defective rails and fastenings, * * * and know that each is safe for movement of trains.

* * *

The maximum authorized speed for the train involved was 100 miles per hour on tangent track, and 90 miles per hour on the curve on which the accident occurred.

Description of Accident

No. 4, an east-bound first-class passenger train, consisted of Diesel-electric units 53, 53B and 53A, of the 0-6-6-0 classification, coupled in multiple-unit control, two baggage cars, three coaches, one dining car, one dormitory-lounge car, and five sleeping cars, in the order named. The first and second cars were of steel-underframe construction, with wooden superstructures covered with steel sheathing. The fourth car was of lightweight high-tensile steel construction, and the remainder of the cars were of conventional carbon-steel construction. This train departed from Garden City, 9.09 miles west of the point of accident and the last open office, at 7:28 a. m., 8 minutes late, passed Mansfield, passed signal 3932, which indicated proceed, and while it was moving at a speed of 78 miles per hour the rear truck of the first Diesel-electric unit, all wheels of the second and third units, and the first to tenth cars, inclusive, and the front truck of the eleventh car were derailed.

Only the fourth car of the train was equipped with tightlock couplers. Separations occurred at each end of the first to fourth cars, inclusive. The Diesel-electric units remained coupled and stopped upright and in line with the track, with the front end of the first unit 1,434 feet east of the point of derailment. The first car stopped on its left side, about 50 feet south of the main track and parallel to it, with its front end 650 feet east of the point of derailment. The second car stopped on its left side and at an angle of 60 degrees to the track, with its front end 80 feet south of the main track and against the side of the first car. The third car stopped on its left side, about 25 feet west of the first car and at an angle of 45 degrees to the track. The fourth car stopped on its left side, at right angles to the track and about 50 feet west of the third car. The fifth car stopped upright, with its front and rear ends, respectively, 10 feet and 50 feet south of the main track. The sixth to eleventh cars stopped upright and in line with each other, with the front end of the sixth car 50 feet south of the track and the eleventh car on the roadbed. The twelfth car was not derailed. The trucks, the traction-motor housings, and the brake rigging of the Diesel-electric units were considerably damaged. The first car was destroyed, the second to fourth cars, inclusive, were badly damaged, and the remainder of the cars were slightly damaged.

The baggageman was injured.

The weather was clear at the time of the accident, which occurred about 7:42 a. m.

Discussion

No. 4 was moving at a speed of 78 miles per hour, as indicated by the speed-recorder tape with which the first Diesel-electric unit was equipped, on a $0^{\circ}30'$ curve to the left, where the maximum authorized speed for this train was 90 miles per hour, when the derailment occurred. Prior to the time of the accident the Diesel-electric units and the cars of the train had been riding smoothly.

As No. 4 was approaching this curve, the enginemen were maintaining a lookout from the front control compartment. Signal 3932 indicated proceed, and the enginemen called the indication. Both the engineer and the fireman said that as the first unit traversed the curve they felt an unusual movement of the engine, and the brakes were applied in emergency before the engineer could take any action to stop the train. The other members of the crew said that they were not aware of anything being wrong until the brakes became applied in emergency.

After the accident a broken rail was found on the south, or high, side of the curve at a point 1,170 feet east of the west end of the curve. This rail was manufactured by the Colorado Fuel and Iron Company in March, 1928. The heat number was 2863, Ingot S, Letter D. The rail was broken into nine pieces, six of which were recovered. The first break occurred within the limits of the joint bars at the receiving end of the rail. This break, which resulted from a crack in the web fillet beginning at a point $1-3/16$ inches from the receiving end, extended diagonally downward through the web to the No. 1 bolt hole, thence upward and away from the end of the rail thereby forming a triangle with the No. 1 hole as its apex and the head of the rail as its base. The crack had existed for some time prior to the derailment. The second break, which was a new fracture, extended upward from bolt hole No. 2 in an irregular diagonal line $4-7/8$ inches long and through the head at a point $13-1/2$ inches east of the end of the rail. This piece was battered downward and lipped over at an angle of about 35 degrees at its west end. The remainder of the breaks extended through the web and the base, and were a result of the derailment.

The division engineer said that the first break occurred as a result of a fatigue crack. He said that the marks on the rail and the manner in which it was broken indicated that the first break occurred under a west-bound train, and that a section of the head, 6-27/32 inches long, at the west end fell from the rail at that time. Then, when the front truck of the first Diesel-electric unit of No. 4 passed over the joint in question, a second section, 6-21/32 inches long, was broken from the head of the rail, and the derailment occurred.

The rails in this vicinity were last tested by a detector car on March 3, 1948, at which time no defective condition was indicated. The track was last surfaced and alined during July, 1948, and was last inspected on the day preceding the accident. The crack in the rail in question was concealed by the joint bars. About 19 minutes before the derailment occurred, a west-bound passenger train passed over this track at a speed of 90 miles per hour, and the members of the crew of this train said there was no indication of defective track. At the rail joint in question, the rail-joint bond was secured to the web of the rail approximately 2 inches from either end of the joint bars. The first and subsequent fractures occurred between the bond-wire connection and the receiving end of the rail, and automatic signal 3932 gave no indication of a defective condition of the rail.

According to a report made by the engineer of tests of this railroad, the end section of the rail in question had been built up to normal section by welding, then flame hardened, on at least two occasions, as evidenced by the overlapping of heat zones. However, none of these zones extended into the web or fillet. The results of Brinnell hardness tests compared favorably with the tensile properties. The chemical analysis disclosed that the manganese content was slightly below A.R.E.A. specifications. There was no alteration of grain as a result of heating, and the rail at the origin of fracture showed normal pearlitic structure. The origin of fracture was in the web fillet and it consisted of an initial crack 5/32-inch deep and 9/16-inch long. This was a comparatively new progressive fracture, as the edges were not worn smooth. The end of the rail was worn and cupped, there was considerable wear underneath the head where the joint bars were in contact with the rail, and the bolt holes were worn and elongated. The conclusion in the report was to the effect that these conditions indicated that the joint bars were not tight, that the ties under the joint were not tamped properly, and that there was creeping of the rail in question.

Cause

It is found that this accident was caused by a broken rail.

Dated at Washington, D. C., this twenty-ninth day of December, 1948.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.