INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 3105

ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

REPORT IN RE ACCIDENT

NEAR MANSFIELD, MO., ON

MAY 30, 1947

SUMMARY

Railroad:	St. Louis-San Francisco
Date:	May 30, 1947
Location:	Mansfield, Mo.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	106
Engine number:	4403
Consist:	14 cars
Speed:	45 m. p. h.
Operation:	Timetable, train orders and automatic block-signal system
Track:	Single; 6°08' curve; 1 percent descending grade northward
Weather:	Clear
Time:	1:47 a. m.
Casualties:	2 killed; 22 injured
Cause:	Broken rail

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3105

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

ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

June 30, 1947

Accident near Mansfield, Mo., on May 30, 1947, caused by a broken rail.

REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On May 30, 1947, there was a derailment of a passenger train on the St. Louis-San Francisco Railway near Mansfield, Mo., which resulted in the death of 2 train-service employees, and the injury of 14 passengers, 6 railway-mail clerks and 2 express messengers.

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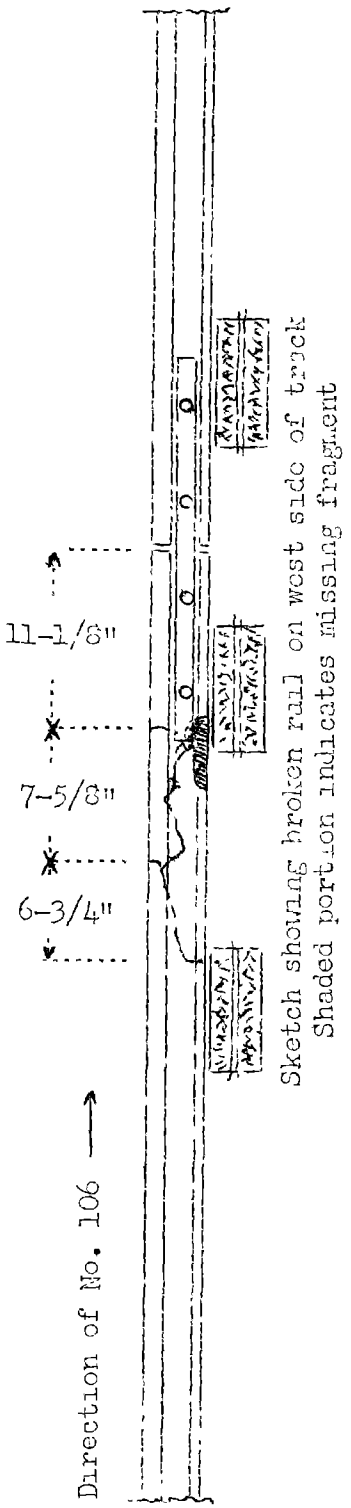
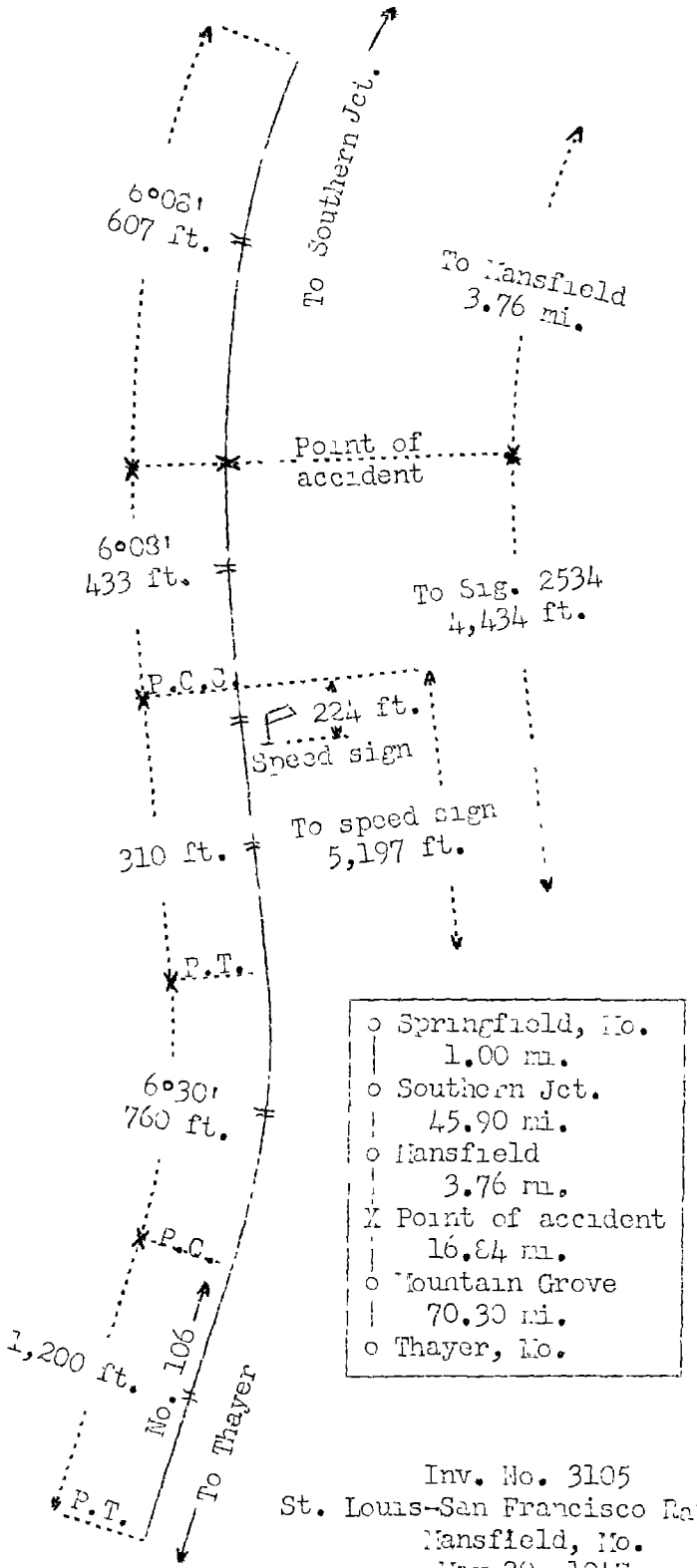
[1] Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



Sketch showing broken rail on west side of track
Shaded portion indicates missing fragment



Inv. No. 3105
St. Louis-San Francisco Railway
Mansfield, Mo.
May 30, 1947

Location of Accident and Method of Operation

This accident occurred on that part of the Southern Division extending between Thayer and Southern Jct., near Springfield, Mo., 136.8 miles, 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 87.14 miles north of Thayer and 3.76 miles south of the station at Mansfield. From the south there are, in succession, a tangent 1,200 feet in length, a 6°30' curve to the left 760 feet, a tangent 310 feet and a compound curve to the right, the maximum curvature of which is 6°08', 433 feet to the point of accident and 607 feet northward. The grade for north-bound trains varies between 0.67 and 1.20 percent descending throughout a distance of 4,200 feet immediately south of the point of accident, where it is 1.0 percent descending.

On the curve on which the accident occurred the track structure consists of 110-pound rail, 39 feet in length, laid new during 1929, on an average of 24 treated ties to the rail length. It is fully tieplated with double-shoulder tieplates, single-spiked, provided with 4-hole head-free angle bars 24 inches in length, and an average of 4 rail anchors per rail length. It is ballasted with chat to a depth of 12 inches. The maximum specified curvature was 6°08' and the maximum specified superelevation was 5-1/2 inches. The derailment occurred 433 feet north of the south end of the south spiral of the curve, where the curvature was 6°08' and the superelevation was 5-1/2 inches. In the immediate vicinity of the point of accident the track was laid on a 33-foot fill. The involved rail section was manufactured by the Tennessee Coal, Iron and Railroad Company. The number was 858988, Letter E.

Automatic signal 2534, governing north-bound movements, is 4,434 feet south of the point of accident. This signal is of the semaphore type and is continuously lighted.

Time-table special instructions prescribe the maximum authorized speed for passenger trains as 70 miles per hour on tangent track and 45 miles per hour on the curve involved. Speed-limit signs bearing the numerals 45-40 are located 10 feet east of the centerline of the track at points 5,197 and 224 feet south of the south end of the curve involved.

Description of Accident

No. 106, a north-bound first-class passenger train, consisted of engine 4403, a 4-8-2 type, two express cars, one baggage-mail car, four baggage cars, three coaches, one dining car and three sleeping cars, in the order named. The first, fourth and fifth cars were of steel-underframe construction, and the remainder of the cars were of all-steel construction. This train departed from Mountain Grove, the last open office, 20.6 miles south of Mansfield, at 1:23 a. m., 8 minutes late, passed signal 2534, which displayed proceed, and while it was moving at a speed of 45 miles per hour the engine, the first eight cars and the front truck of the ninth car were derailed.

Immediately after the derailment separations occurred at each end of the first to fifth cars, inclusive. The engine and tender were derailed to the left, rolled laterally 360 degrees and stopped upright, down the embankment and 50 feet west of the centerline of the track and practically parallel to it, with the front end 308 feet north of the point of derailment. The cab was demolished, steam pipes within the cab were broken, and the engine was otherwise considerably damaged. The first car stopped on its side, across the top of the tender and at right angles to the track. The second car stopped on its side, down the embankment and at right angles to the track, with one end at the rear of the tender and the other end 20 feet west of the track. The third car stopped down the embankment, 65 feet west of the track and parallel to it, with its front end at the rear of the tender, and leaned to the west at an angle of 45 degrees. The fourth car stopped upright and at right angles to the track, at a point about 160 feet north of the point of derailment, with one end on the roadbed and the other end down the west side of the embankment. The fifth car stopped upright, about 10 feet south of the fourth car and at right angles to the track, with one end on the roadbed and the other end down the east side of the embankment. The sixth and seventh cars stopped practically in line with each other, with the front end of the sixth car 140 feet north of the point of derailment and 45 feet west of the track, and the rear end of the seventh car on the roadbed. The sixth car leaned to the west at an angle of 45 degrees and the seventh car remained upright. The eighth and ninth cars remained upright on the roadbed and in line with it. The first to seventh cars, inclusive, were badly damaged, and the eighth and ninth cars were slightly damaged.

The engineer and the fireman were killed.

The weather was clear at the time of the accident, which occurred about 1:47 a. m.

Discussion

No. 106 was moving at a speed of 45 miles per hour, as indicated by the tape of the speed-recorder with which the engine was equipped, on a 6°08' curve to the right where the maximum authorized speed for this train was 45 miles per hour, when the derailment occurred. The engineer and the fireman were killed. When the accident occurred the conductor and a road foreman of equipment were in the ninth car, the train porter was in the eighth car and the flagman was in the rear car. These employees said that prior to the time of the accident, the cars had been riding smoothly, and there was no indication of defective equipment or track, nor of any obstruction having been on the track. The first they knew of anything being wrong was when they felt a severe closure of slack, then the brakes became applied in emergency as a result of the derailment.

After the accident a broken rail was found on the high, or west, side of the curve at a point 433 feet north of the south end of the curve. The rail was broken into seven pieces, six of which were recovered. The first break occurred at a point 11-1/8 inches south of the leaving end of the rail, over a tie, about 1 inch north of the south ends of the angle bars and 2-1/2 inches north of the south bond-wire connection. This break extended diagonally upward and southward through the base and about 50 percent of the web, then diagonally northward to a point where it broke out at the head of the rail. The second break extended southward in an irregular line through the web, then upward through the head in a square break at a point 7-5/8 inches from the first break. From this second break through the head the line of break extended diagonally downward through the web and broke through the base at a point 6-3/4 inches southward. The remainder of the breaks were pieces breaking off in this area as a result of the derailment. The first break was a result of a progressive fracture, which started at the juncture of the web and the head of the rail, and was primarily a fillet crack. This developed until it had extended upward into the head of the rail 3/4-inch and downward into the web 1-1/2-inches. In addition, two secondary cracks were found in the immediate region of the first fracture. All of these cracks disclosed discoloration as a result of oxidation. The remainder of the breaks were new. The chief chemist of the railroad said that the first break occurred as the result of a fatigue crack of

considerable size in both fillets of the rail. At the point of break the head was worn about 1/4-inch at the top of the gage side, and the gage side was curve-worn about 1/8-inch at the top and 1/16-inch at the bottom. Analysis indicated that the chemical components of the rail were in accordance with the carrier's specifications. There was a slight segregation of metal, but not sufficient to classify the rail as being defective.

Marks on the rail, the inside angle bar and the top of the flange of the left No. 2 driving-wheel tire indicated that as the engine of No. 106 traversed the curve involved, the flanges of the engine-truck wheels and left No. 1 driving-wheel exerted sufficient lateral force to snap the head of the rail outwardly, then the flange of the left No. 2 driving wheel struck the top of the south end of the inside angle bar, and this wheel was derailed.

A south-bound freight train passed over the rail involved about 1 hour 35 minutes before the derailment occurred, and the crew observed no indication of defective track. However, the first fracture could have existed prior to the passage of No. 106, as it was located within the angle bars. As this fracture was between the bond-wire connections at the rail joint, the automatic block signals gave no indication of defective condition of the rail.

The track involved was last inspected by the section foreman about 17 hours before the accident occurred, and no defective condition of the rail was observed. The fillet crack involved was concealed from detection by ordinary visual inspection by the fit of the head-free angle bars against the fillet. The rail involved was last tested by a detector car on March 29, 1947, and no defective condition was indicated.

Cause

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

Dated at Washington, D. C., this thirtieth day of June, 1947.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.