INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 3179

ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

REPORT IN RE ACCIDENT

NEAR ADAMSVILLE, ALA., ON

APRIL 25, 1948

SUMMARY

Railroad:	St. Louis-San Francisco
Date:	April 25, 1948
Location:	Adamsville, Ala.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	1354
Engine number:	2459
Consist:	13 cars
Speed:	20 m. p. h.
Operation:	Signal indications
Track:	Single; 9°24' curve; 0.7 percent descending grade northward
Weather:	Clear
Time:	3:50 a. m.
Casualties:	3 killed; 125 injured
Cause:	Defective tender-truck side-bearing plate

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3179

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

ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

June 25, 1948

Accident near Adamsville, Ala., on April 25, 1948, caused by a defective tender-truck side-bearing plate.

REPORT OF THE COMMISSION[1]

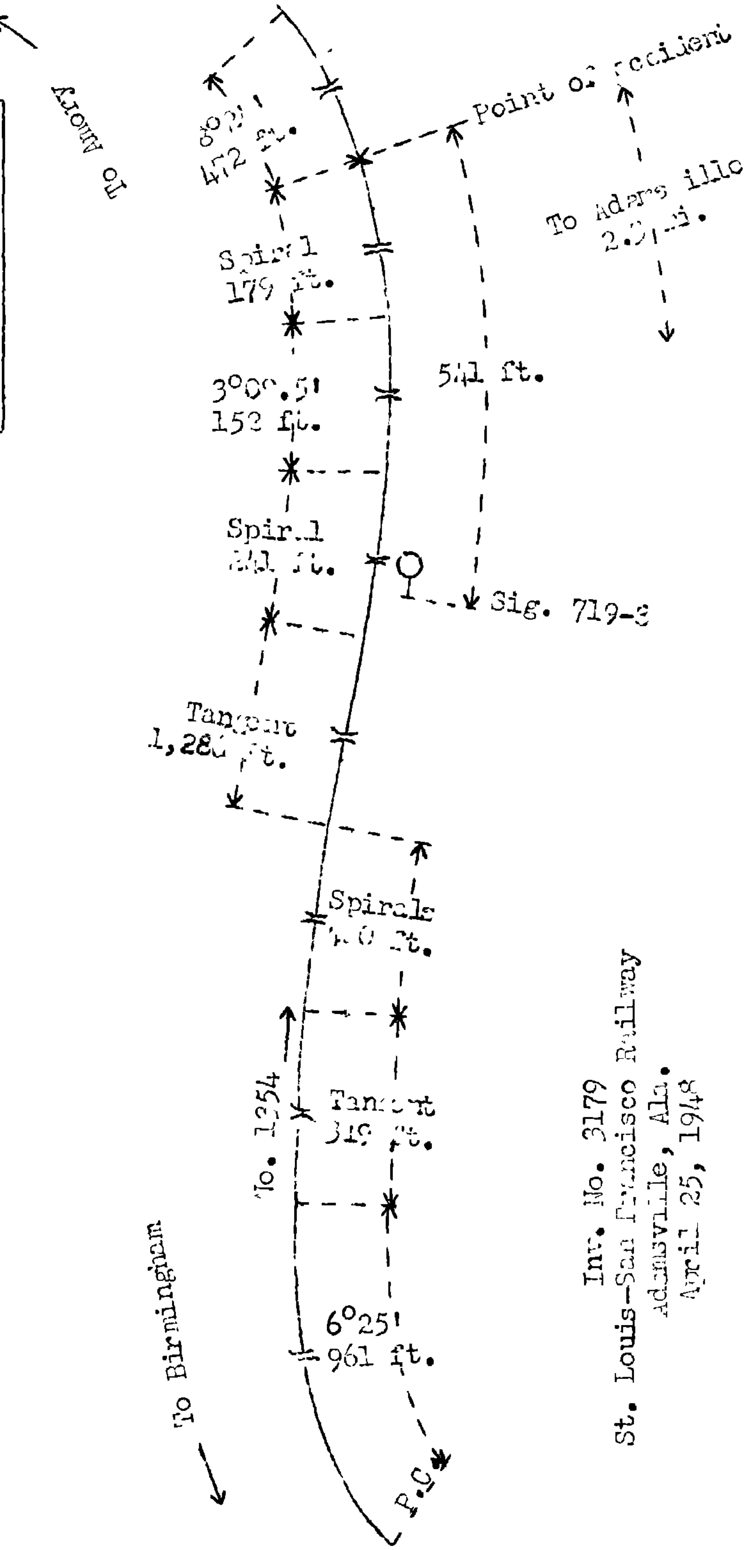
PATTERSON, Commissioner:

On April 25, 1948, there was a derailment of an Illinois Central Railroad passenger train on the line of the St. Louis-San Francisco Railway near Adamsville, Ala., which resulted in the death of 1 passenger and 2 employees, and the injury of 106 passengers, 4 Pullman employees, 11 dining-car employees, 1 coach attendant, 1 train porter and 2 train-service employees.

---

[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.

Amory, Miss.
32.6 mi.
Jasper, Ala.
26.0 mi.
X Point of accident
2.3 mi.
Adamsville
12.7 mi.
Birmingham, Ala.



Inv. No. 3179
St. Louis-San Francisco Railway
Adamsville, Ala.
April 25, 1948

Location of Accident and Method of Operation

This accident occurred on that part of the Southern Division extending between Birmingham, Ala., and Amory, Miss., 123.6 miles. In the vicinity of the point of accident this is a single-track line, over which trains are operated by signal indications. Trains of the Illinois Central Railroad are regularly operated over that portion of the line extending between Birmingham and Jasper, Ala., 41 miles. The accident occurred on the main track at a point 15 miles north of Birmingham and 2.3 miles north of the station at Adamsville. From the south there are, in succession, a tangent 1,286 feet in length, a spiral curve to the left 241 feet, a 3°09.5' curve to the left 152 feet, a spiral curve to the left 179 feet and an 8°24' curve to the left 472 feet in length. The derailment occurred at the point where the last-mentioned spiral joins the 8°24' curve. The grade for north-bound trains varies between 0.3 and 2.1 percent descending throughout a distance of about 5,000 feet immediately south of the point of accident, where it is 0.7 percent.

On the curve on which the accident occurred the track structure consists of 112-pound rail, 39 feet in length, laid on an average of 24 treated ties to the rail length. The low rail was laid new during April, 1945, and the high rail was laid new during March, 1947. The track is fully tieplated with double-shoulder canted tieplates, single-spiked, provided with 4-hole joint bars, and 12 rail anchors and 4 gage rods per rail length. It is ballasted with rock screenings to a depth of 18 inches below the ties. The specified superelevation on the curve was 4-1/2 inches. At the point of derailment the gage was 4 feet 8-1/2 inches and the superelevation was 4-1/2 inches. In this vicinity the track is laid on a hillside rock cut, and is about 125 feet above the level of the bed of a ravine on the east.

Automatic signal 719-S, governing north-bound movements, is 541 feet south of the point of accident.

Operating rules of this carrier read in part as follows:

14. Engine Whistle Signals

NOTE: The signals prescribed are illustrated by "o" for short sounds; "___" for longer sounds * * *

Sound	Indication
* * *	
(q) __ o o __	Answer to yellow signal * * *
* * *	

Time-table special instructions prescribe the maximum authorized speed for the train involved as 65 miles per hour on tangent track and 35 miles per hour on the curve on which the derailment occurred.

Description of Accident

No. 1354, a north-bound first-class I.C. passenger train, consisted of engine 2459, a 4-8-2 type, one baggage-dormitory car, two coaches, three sleeping cars, one dining car and six sleeping cars, in the order named. All cars were of steel construction. This train departed from Birmingham at 3:14 a. m., 19 minutes late, passed Adamsville at 5:46 a. m., 21 minutes late, passed signal 719-S, which displayed an approach indication, and while it was moving at an estimated speed of 20 miles per hour the engine, the tender, the first nine cars and the front truck of the tenth car were derailed.

The engine overturned to the right and stopped on its right side down the embankment, headed westward and at right angles to the track, with the front end 203 feet north of the point where it was derailed and 55 feet east of the centerline of the track. The cab was demolished and steam pipes within the cab were broken. The right side of the engine and the left rear corner of the firebox, the frame, and the trailer-truck were considerably damaged. The tender, remaining coupled to the engine, stopped upside down at the rear of the engine and at an angle of 45 degrees to it. Both trucks were detached and were badly damaged. The front truck stopped on the shoulder of the embankment and about 35 feet south of the engine. The rear truck was broken into several pieces, and stopped at various locations on the embankment. Separations occurred at each end of the first five cars and the eighth car. The first car stopped on its right side on top of the tender and parallel to the track. The front truck-frame was broken into several pieces and stopped in various locations on the embankment. This car was demolished. The second car stopped down the embankment, practically upright and at an angle of 30 degrees to the track, with the front end about 20 feet south of the engine and 38 feet east of the track. This car was badly damaged. The third car stopped down the embankment, practically upright and at an angle of 45 degrees to the track, with its front end opposite the rear of the second car and 50 feet east of the track. The left side was crushed inward about 3.5 feet at a point about 20 feet back of the front end. This car was demolished. The fourth car stopped upright, down the embankment and at right angles to the track, with its front end 150 feet south of the engine and 175 feet east of the track. The fifth

car stopped down the embankment and at an angle of 45 degrees to the track, and leaned to the right at an angle of 45 degrees, with the front end at the rear of the fourth car and 90 feet east of the track. The sixth and seventh cars stopped upright, practically in line with each other and at a slight angle to the track, with the front end of the sixth car against the rear of the fifth car and 25 feet east of the track. The eighth car stopped upright, with the front end about 10 feet to the rear of the seventh car and 5 feet east of the track, and the rear end on the roadbed. The ninth and tenth cars remained upright on the roadbed, with the front end of the ninth car about 5 feet to the rear of the eighth car. The second, and the fourth to eighth cars, inclusive, were considerably damaged. The ninth and tenth cars were slightly damaged. The sixth car only was equipped with tightlock couplers.

The engineer and the fireman were fatally injured. The conductor and the baggageman were injured.

The weather was clear at the time of the accident, which occurred about 3:50 a. m.

The total weight of engine 2459 in working order is 380,686 pounds, distributed as follows: Engine truck, 56,853 pounds; driving wheels, 259,013 pounds; and trailer truck, 64,820 pounds. The specified diameters of the engine-truck wheels, the driving wheels, and the trailer-truck wheels are, respectively, 33, 73.5 and 44 inches. The driving wheelbase is 12.5 feet long, the total length of the engine wheelbase is 42 feet 3 inches, and the total length of the engine and tender is 88 feet 4-1/4 inches. The engine truck and the trailer truck are provided with rocker-type constant-resistant devices. A radial-buffer assembly with floating block is arranged between the engine and the tender. The engine is not equipped with a speedometer.

The tender is 28 feet 10 inches long, is rectangular in shape, and is equipped with two 4-wheel trucks. Its capacity is 10,200 gallons of water and 22 tons of coal. The weight of the tender loaded is 213,500 pounds. The height of the coal bunker is 14 feet 2-13/16 inches above the level of the tops of the rails. When the bunker is fully loaded the level of the top of the coal is about 2-1/2 feet higher than the top of the bunker. The bottom frame of the tender is of one-piece cast-steel construction. The tender-truck centers are spaced 17 feet 8 inches apart, and each wheelbase is 6.5 feet long. The trucks are of the swing-motion type, with converging swing hangers, one-piece frames and pedestals. The bolsters and center plates are integral. Drop-type equalizer

bars, extending between outside journal boxes and suspended upon them, support two helical springs near each pedestal. A cluster of three elliptical springs is arranged on the spring plank under each end of each bolster. Single-roller side bearings spaced 48 inches between centers are provided on each truck bolster, and side-bearing plates are arranged on each body bolster. The side-bearing plates on the rear body bolster are 12-1/2 inches long by 4-1/2 inches wide and 1 inch thick. A shim 1/4-inch thick is inserted under these plates. The plates are secured by two 3/4-inch bolts, the heads of which are counter-sunk in the plates and spaced 7-1/2 inches apart. The bolts are secured from above by hexagonal nuts. The truck center pins are non-locking. The trucks are not equipped with safety chains.

The last class 3 repairs were completed on March 13, 1948. The last monthly inspection and repairs were completed on April 11, 1948. The last trip inspection and repairs were completed on April 24, 1948. The accumulated mileage since the last class 3 repairs was 5,137 miles.

The center of gravity of the engine is 77 inches above the tops of the rails. The center of gravity of the tender, with the calculated amount of fuel and water remaining at the time of the accident, was estimated as 70.8 inches above the tops of the rails. The equilibrium, safe and overturning speeds for engine 2459 moving on an 8°24' curve having a superelevation of 4-1/2 inches are, respectively, 28.5, 43.2 and 65.9 miles per hour. The equilibrium, safe and overturning speeds for the tender on the same curve, with the calculated amount of fuel and water, are, respectively, 28.5, 49.7 and 68.2 miles per hour.

Discussion

No. 1354 had traversed a 6°28' curve to the right 961 feet in length, a tangent 319 feet, two short spiral curves totaling 480 feet, a tangent 1,256 feet, a spiral curve to the left 241 feet, a 3°09.5' curve to the left 152 feet, then an easement spiral 179 feet, and had just entered upon an 8°24' curve to the left when it was derailed. The maximum authorized speed for this train on the curve involved was 35 miles per hour. Prior to the time of the accident the cars of the train had been riding smoothly.

As No. 1354 was approaching the curve on which the accident occurred the baggageman was in the front end of the first car, the conductor and the train porter were in the rear of the first car, and the flagman was in the rear car. These employees heard the engine whistle-signal sounded in acknowledgment of the approach indication displayed by signal 719-8.

They said that in the vicinity of this signal an application of the brakes was made and that the speed was reduced to about 20 miles per hour as the train entered the curve. The first any member of the train crew knew of anything being wrong was when the brakes became applied in emergency. The brakes of this train had been tested and had functioned properly en route.

Examination of the track throughout a distance of one mile immediately south of the point of derailment disclosed no indication of defective track, dragging equipment, or of any obstruction having been on the track. The surface and alinement were well maintained for the maximum authorized speed. The track was last gaged on April 20, 1948, and was inspected by the section foreman the day before the accident occurred. The crew of a north-bound freight train that passed over the track involved about 50 minutes prior to the accident said the engine and cars rode smoothly at a speed of 30 miles per hour, and there was no indication of defective track. A rail detector car was last operated over this territory during March, 1948, and no defective condition of the rails in question was indicated.

The first indication of disturbed track was at a point 32.5 feet south of the point of full curvature of 8°24'. This was a wheel mark on the head of a spike inside the low rail. Opposite this mark the high, or east, rail was canted outward, and bore wheel marks in the web. Starting at a point 5.5 feet northward the high rail was overturned and pushed eastward off the ties throughout a distance of 504 feet to a point 34 feet south of the point where the engine slid down the embankment. Northward from the first mark on the track, flange marks appeared on the tops of the ties 8-1/2 inches inside the low rail, and flange marks appeared in the web of the high rail throughout a distance of 102 feet. Then the ties were badly flange-marked in various locations and directions. At a point 367 feet north of the first mark, the high rail was broken and the succeeding rail was broken. This latter rail broke into several pieces after it was bent 49 inches out of line under severe stress. Near this location, 19 ties had been torn from the track.

When the engine was examined after the accident the throttle was in drifting position, the reverse lever was in position for 35 percent cutoff in forward motion, the independent brake valve was in running position, and the automatic brake valve was in emergency position. The engine truck was intact and properly secured on its center pin. The constant-resistant device was well lubricated and in good

condition. The male center casting, which was securely fastened to the cylinder saddle, had entered the female casting about 2-1/4 inches and there was no indication of binding. The driving-wheel assembly and its spring system were in good condition, and there was no indication of unequal distribution of weight. The trailer-truck center pin had been recently broken, and the center cup was badly battered. Both spring equalizers were bent downward. The rear spring hanger of the left trailer-truck spring was broken at the gib hole and bore indications of repeated blows. The rear end of the spring was spread apart as a result of its having been struck by some heavy object. The left heart-shape rocker was out of place and was not found. However, this arrangement is so designed that it cannot move out of place as long as an engine is upright upon the rails. All wheels were tight on their axles and all tires were tight on their wheel centers. Measurements of the wheels and the lateral motion were within the prescribed limits. The driving box shoes and wedges were well lubricated and moved freely. The radial buffer assembly was well lubricated. The floating block was lost when the safety bar and drawbar were twisted at an angle of about 50 degrees at the tender end. The front tender truck was intact, except that the springs had dropped from the left side and were adjacent to the truck. Both side frames of the rear tender-truck were broken. The male center castings had entered the female castings of each truck about 1-1/2 inches.

Analysis of the failed parts of the broken spring hanger, both truck side frames of the tender and the front truck of the first car, and the broken rails disclosed them to be of sound metal and free of any defects. All the breaks occurred as a result of the derailment.

The right rear body-bolster side-bearing plate was missing. Examination disclosed that the rear bolt of this plate had been in place and had been sheared. The front bolt hole in the bolster was elongated and varied between 3/4-inch and 1-1/8 inches in diameter. The bolts are inserted with the threaded portion upward, and there is no provision to retain the bolt if the nut works off. Apparently, the forward bolt of the side-bearing plate on the right side of the rear body bolster had been missing some time prior to the derailment, and the rear bolt became sheared during the derailment. As a result of the forward bolt not being in place, the plate pivoted on the rear bolt and swung outward and thereby increased the normal clearance of the bearing 1-1/4 inches. None of the wheels of the engine or the tender, except the right No. 4 tender-truck wheel, bore any scars or marks to indicate they

had been in abnormal contact with the track structure. There was no ballast mark on any of the wheels of the engine, and the pilot was not marked or damaged to any extent. The tread of the right No. 4 tender-truck wheel bore an indication that it had run in contact with the base of a rail throughout a considerable distance. The right side of the tender was badly scraped by ballast, and the left front corner of the frame was bent. It is apparent that the rear tender truck was the first to be derailed, as the couplers at the rear of the tender and at the front of the first car bore indications that the coupler of the first car had rested on top of the coupler of the tender during the process of derailment. When the derailment occurred the tender was loaded with coal to a height of about 16 feet above the level of the tops of the rails, and about 8,000 gallons of water remained in the cistern. Because of track curvature, small irregularities in the alinement, surface and gage of the track and the brakes being applied, the tender body would rock to the extent permitted by the side bearings. The tender bed was of the one-piece cast-steel type, and therefore no torsional easement could occur. Considering the marks on the track, on the rear tender truck, particularly on the tread of the right No. 4 wheel, and the overturned rail on the high side of the curve, it appears that as the train was approaching the point of derailment the heavily loaded tender rolled to the right. Then, because of the displaced side-bearing plate, the tender rolled excessively, and there was considerable stress exerted upon the right front side bearing, then the tender rolled to the left and momentarily most of its weight was shifted to the left wheels and this action lifted the right wheels of the rear truck. Because of track curvature, considerable pressure was exerted against the high rail by the right front wheel of the rear truck and, when the load was lifted to the left, this wheel was forced suddenly over the top of the high rail and the right rear wheel dropped inside the rail, which then was canted outward, and the left front wheel of the rear truck dropped inside the low rail. When the high rail overturned, the rear of the tender swung to the east and the general derailment followed.

Cause

It is found that this accident was caused by a defective tender-truck side-bearing plate.

Dated at Washington, D. C., this twenty-fifth day of June, 1948.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.