

INTERSTATE COMMERCE COMMISSION

WASHINGTON

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INVESTIGATION NO. 3134

ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

REPORT IN THE ACCIDENT

AT NICHOLS, MO., ON

OCTOBER 5, 1947

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SUMMARY

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Railroad: St. Louis-San Francisco  
Date: October 5, 1947  
Location: Nichols, Mo.  
Kind of accident: Derailment  
Train involved: Passenger  
Train number: 8  
Engine number: 4104  
Consist: 9 cars  
Speed: 67 m. p. h.  
Operation: Signal indications; interlocking  
Track: Single; 7°17' curve; 0.80 percent descending grade eastward  
Weather: Foggy  
Time: 6:21 a. m.  
Casualties: 1 killed; 1 injured  
Cause: Excessive speed on curve  
Recommendation: That the St. Louis-San Francisco Railway Company provide an indication on signal 18L for east-bound movements to the connecting track at Nichols

INTERSTATE COMMERCE COMMISSION

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INVESTIGATION NO. 3134

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

ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

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December 4, 1947

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Accident at Nichols, Mo., on October 5, 1947, caused by  
excessive speed on a curve.

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REPORT OF THE COMMISSION<sup>1</sup>

PATTERSON, Commissioner:

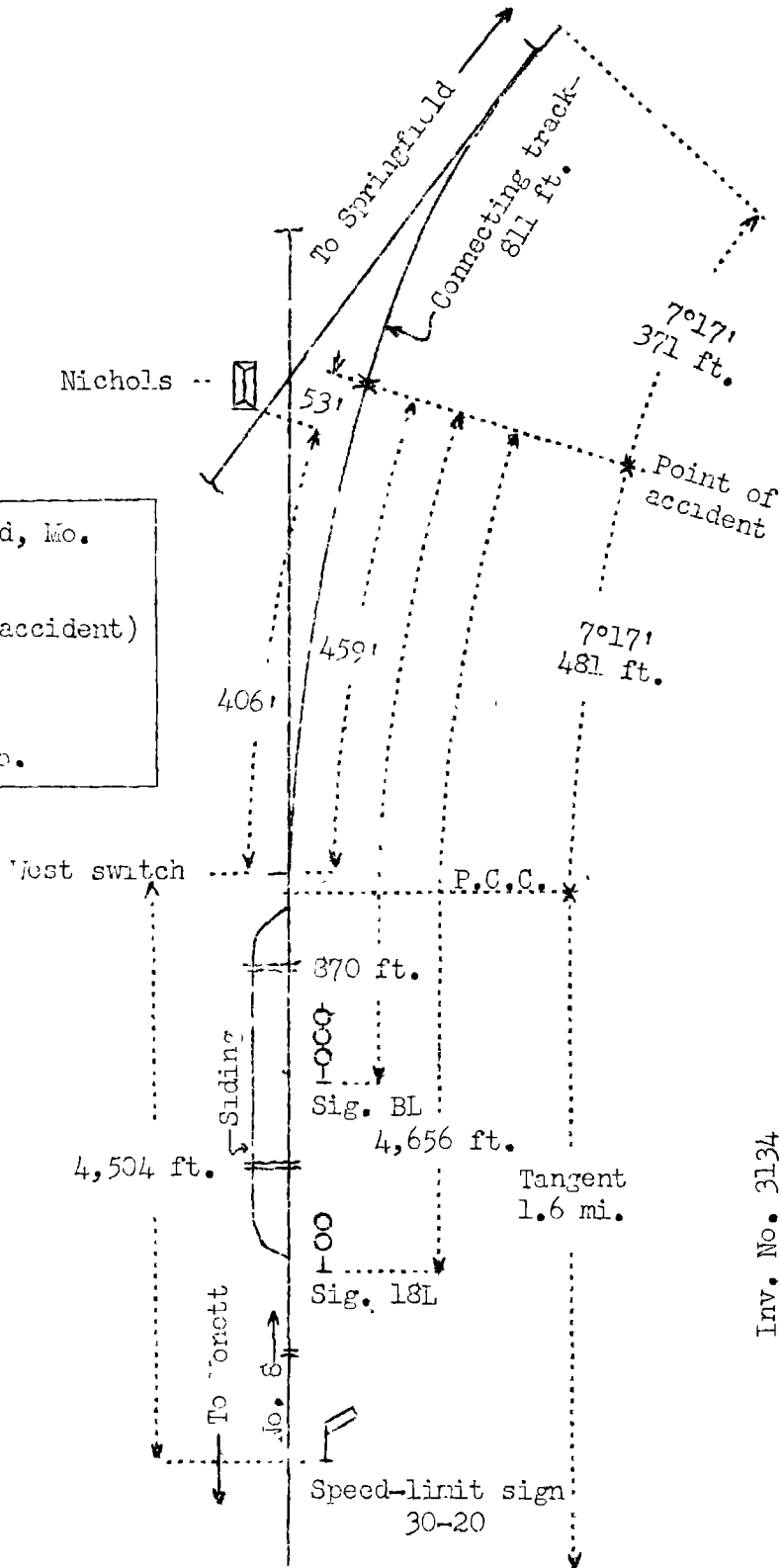
On October 5, 1947, there was a derailment of a passenger train on the St. Louis-San Francisco Railway at Nichols, Mo., which resulted in the death of one train-service employee, and the injury of one train-service employee.

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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.

- Springfield, Mo.  
2.9 mi.
- X Nichols  
(Point of accident)  
26.9 mi.
- Aurora  
13.1 mi.
- Monnett, Mo.



Inv. No. 3134  
 St. Louis-San Francisco Railway  
 Nichols, Mo.  
 October 5, 1947

Location of Accident and Method of Operation

This accident occurred on a track connecting the portion of the Eastern Division extending between Monett and North Springfield, Mo., 44.3 miles, and the portion of the Eastern Division extending between Nichols and Springfield, 2.9 miles. These lines intersect at Nichols, 40 miles east of Monett, and the connecting track is in the southeast angle of the intersection. The line between Nichols and Springfield is designated as the passenger main track. The connecting track is 811 feet long, and the west switch is 420 feet west of the crossing. Entry to this track from the west is made through a No. 15 turnout to the right. The accident occurred at a point 459 feet east of the west switch of the connecting track. This switch is within interlocking limits, and is controlled from an interlocking machine in the station at Nichols. Between Monett and Nichols and between Nichols and Springfield trains are operated by signal indications of a centralized-traffic-control system controlled from Springfield. The west switch of a siding 4,118 feet long is 4,558 feet west of the crossing.

From the west there are, in succession, a tangent 1.6 miles in length, a turnout to the right having a curvature of  $2^{\circ}42'$ , 132 feet long, a spiral curve 180 feet, a  $7^{\circ}17'$  curve 147 feet to the point of accident and 36 feet beyond. The grade varies between 0.51 and 0.90 percent descending throughout a distance of 1,300 feet immediately west of the point of accident, where it is 0.80 percent descending.

The structure of the connecting track consists of 110-pound rail, 39 feet in length, laid new in 1930 on 23 treated ties to the rail length. It is fully tieplated, single-spiked, provided with 4-hole joint bars 24 inches in length, and an average of 6 rail anchors per rail length. It is ballasted with chat to a depth of 12 inches. The specified superelevation was 3 inches. The superelevation varied between  $2-1/4$  inches and  $2-7/8$  inches, and the gage varied between 4 feet  $8-3/4$  inches and 4 feet  $9-1/4$  inches. At the point of accident, the superelevation was  $2-7/8$  inches and the gage 4 feet  $8-3/4$  inches.

Approach signal 18L and home signal BL, governing east-bound movements, are, respectively, 4,656 feet and 870 feet west of the point of accident. These signals are of the searchlight type, continuously lighted, and their aspects and corresponding indications and names are as follows:

<u>Signal</u>	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
<u>When lined for connecting-track route</u>			
18L	Green-over-red	PROCEED	CLEAR SIGNAL
BL	Red-over-green-over-red	PROCEED THROUGH TURNOUT AT PRESCRIBED SPEED	DIVERGING CLEAR SIGNAL
<u>When lined for North Springfield route</u>			
18L	Green-over-red	PROCEED	CLEAR SIGNAL
BL	Green-over-red-over-red	PROCEED	CLEAR SIGNAL
<u>When lined for entry at west siding-switch</u>			
18L	Red-over-yellow	PROCEED THROUGH TURNOUT AT PRESCRIBED SPEED PREPARED TO STOP AT NEXT SIGNAL	DIVERGING APPROACH SIGNAL

The interlocking at Nichols consists of an electro-mechanical machine having 22 working levers. Time, indication and route locking are provided. Controlling circuits are so arranged that when the route is lined for an eastward movement over the crossing, home signal BL will display proceed, and when the route is lined for movement over the connecting track, home signal BL will display proceed-through-turnout-at-prescribed-speed. Approach signal 18L will display proceed in either case.

This carrier's operating rules read in part as follows:

DEFINITIONS

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Fixed Signal--A signal of fixed location indicating a condition affecting the movement of a train or engine.

NOTE TO DEFINITION OF FIXED SIGNAL--The definition of a "Fixed Signal" covers such signals as \* \* \* block, interlocking, \* \* \* restricted speed signs \* \* \* that govern the movement of a train or engine.

101(a). \* \* \*

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Permanent slow speed signs will be placed three-fourths mile in advance of the point where speed restrictions, as designated by special instructions or by general order become effective. The maximum speed of trains on track protected by such signs will be shown on the face thereof. Where two speeds are prescribed the higher speed governs passenger trains, \* \* \*

\* \* \*

743. \* \* \* enginemen \* \* \* during stormy or foggy weather must take extraordinary precautions at switches and all other places where authority to proceed depends on signals.

Time-table special instructions prescribe the maximum authorized speed for the train involved as 70 miles per hour on tangent track west of the interlocking limits at Nichols, 60 miles per hour on tangent track through the interlocking and 30 miles per hour on the connecting track. A speed-limit sign 10 inches wide by 36 inches long and bearing the numerals 30-20 in black on a yellow background is mounted diagonally on a mast located 10 feet south of the centerline of the track and 4,504 feet west of the west connecting-track switch.

Description of Accident

No. 8, an east-bound first-class passenger train, consisted of engine 4404, of the 4-8-2 type, one express-refrigerator car, two baggage cars, one baggage-mail car, two baggage cars, one coach, one chair car and one sleeping car, in the order named. The first car was of steel-under-frame construction, and the remainder of the cars were of all-steel construction. This train departed from Aurora, 26.9 miles west of Nichols, at 5:52 a. m., 1 hour 48 minutes late, passed signal 18L, which displayed proceed, passed home signal BL, which displayed proceed-through-turnout-at-prescribed-speed, entered the connecting track at the

west switch and while moving at a speed of 67 miles per hour the engine and the first car and the first and second pairs of wheels of the front truck of the second car were derailed.

The engine overturned to the left and stopped on its left side at the foot of a 10-foot embankment, with the front end 269 feet east of the point of derailment and 27 feet north of the centerline of the track. The cab was demolished, and the left side of the engine was badly damaged. The engine truck was torn loose, and stopped about 38 feet in front of the engine. The tender remained coupled to the engine and stopped upside down, off its trucks, and in line with the track. It was badly damaged. The first car stopped down the embankment, upside down, with its front end 133 feet east of the engine, and 28 feet north of the centerline of the track, and at an angle of 10 degrees to it. The remainder of the train remained coupled and stopped with the front end of the second car 865 feet east of the engine. The first car was badly damaged, and the second, third and sixth cars were slightly damaged.

Day was breaking and a dense fog prevailed at the time of the accident, which occurred about 6:21 a. m.

The fireman was killed, and the engineer was injured.

Engine 4404 is equipped with a booster engine mounted on the trailer truck. The total weight of the engine in working order is 419,200 pounds, distributed as follows: Engine truck, 75,180 pounds; driving wheels, 278,950 pounds; and trailer truck, 65,070 pounds. The specified diameters of the engine-truck wheels, the driving wheels and the trailer-truck wheels are, respectively, 33, 70 and 44 inches. The rigid wheelbase of the engine is 18 feet 3 inches long, the total wheelbase is 42 feet 6 inches and the total length of the engine and tender is 97 feet 9-1/4 inches. The No. 1 pair of driving wheels is equipped with a lateral-motion device.

The tender is rectangular in shape and is equipped with two 4-wheel trucks. Its capacity is 14,000 gallons of water and 5,000 gallons of oil.

The center of gravity of the engine is 77 inches above the tops of the rails, and the center of gravity of the tender, with the calculated amount of fuel and water remaining at the time of the accident, was 80 inches above the tops of the rails.



The last class 3 repairs were completed on February 15, 1946, and the last annual, quarterly and monthly inspections and repairs were completed, respectively, on January 30, 1947, July 28, 1947, and September 26, 1947. The last trip inspections and repairs were completed at Monett, Mo., about 10:10 p. m., October 4, 1947. The accumulated mileage since the last class 3 repairs was 150,168 miles.

The calculated equilibrium, safe and overturning speeds for engine 4404 moving on a 7°17' curve having a superelevation of 2-7/8 inches are, respectively, 24, 42 and 69 miles per hour. This engine is equipped with a speed-indication and recording device.

### Discussion

The route was lined for No. 8 to enter the connecting track at Nichols at the west switch and to proceed through the east connecting-track switch to the main track en route to the passenger station at Springfield, 2.9 miles eastward. Approach signal 18L was displaying a proceed indication and home signal BL was displaying a proceed-through-turnout-at-prescribed-speed indication. The maximum authorized speed for No. 8 was 70 miles per hour on tangent track west of the western limit of the interlocking, 60 miles per hour on tangent track within interlocking limits and 30 miles per hour on the connecting track. This train entered the connecting track at the west switch and was moving on the 7°17' curve to the right when the engine overturned to the left and the first two cars were derailed.

As No. 8 was approaching Nichols, the conductor was in the seventh car, the train porter was on the front platform of the eighth car, and the flagman was at the rear end of the rear car. A dense fog restricted visibility to a distance of about 500 feet. The first the members of the train crew knew of anything being wrong was when the derailment occurred. The conductor thought the brakes were applied in emergency immediately before the accident occurred, but the train porter and the flagman said they felt no brake application in the vicinity of Nichols until the derailment occurred. The engineer was so seriously injured that he could not be questioned during the investigation. The fireman was killed. The operator at Nichols was on the platform to inspect the equipment of No. 8 as the train passed his location. He said that immediately before the engine entered the turnout of the west connecting-track switch there was no indication that the brakes were applied. However, when

the engine reached the approximate point of full curvature, he observed sparks flying from the wheel flanges, then the engine overturned to the left.

The speed-recorder tape indicated that No. 8 was moving at a speed of 66 miles per hour when the engine entered the turnout of the west switch. However, during tests after the accident, the speed-recorder registered 1 mile per hour slow at speeds between 40 and 90 miles per hour. Examination disclosed no defective condition of the engine or cars which could have contributed to the cause of the accident. The engine-truck, the driving-wheel and the trailer-truck assemblies were in good condition. The tires, the wheels and the lateral motion were within the prescribed limits. The driving-box shoes and wedges and radial castings were well lubricated, and moved freely. The spring arrangements were maintained in good alinement and there was no indication of unequal distribution of weight. There was no mark on the wheels of the engine to indicate that they had been in contact with the ballast structure. The throttle lever was in closed position, the reverse lever was in position for 30 percent cut-off in forward motion, the automatic brake valve was in emergency position, and the independent brake valve was in running position. Tests disclosed that the air-brake equipment of the engine and of the cars functioned properly. All angle cocks were in proper position, and the travel of the brake-cylinder pistons was within the prescribed limits.

Examination of the track disclosed that the surface, alinement and gage on the curve were well maintained for the maximum authorized speed. There was no indication of defective track, dragging equipment, or of any obstruction having been on the track. The track in this vicinity was last inspected by members of the track force on the day before the accident occurred. The enginemen of a west-bound passenger train which passed over this track about 20 minutes before the derailment occurred said that their engine rode smoothly at a speed of about 30 miles per hour, and there was no indication of defective track.

The first mark on the track structure was a flange mark on the top of a tie 16 inches outside the high rail at a point 147 feet east of the point of full curvature. Then a mark appeared on top of the ties between the rails at a point 75 feet eastward. These marks probably were made by the wheels of the front truck of the second car as it was pulled from the track by the first car. The track structure was neither torn-up nor greatly disturbed.

At the point of derailment the calculated overturning speed for engine 4404 was 59 miles per hour, and the maximum safe speed was 42 miles per hour. The engine was moving at a speed of 67 miles per hour, and had traversed a distance of 147 feet on a 7°17' curve. The speed of the train and the irregularities in surface and alinement of the connecting track were sufficient to cause the engine to overturn.

The approach signal was so arranged that it displayed proceed when the home signal displayed either a proceed indication for straight-track movement or a proceed-through-turnout-at-prescribed-speed indication for diverging movement. The maximum authorized speed was 70 miles per hour to the home signal, 60 miles per hour for straight-track movement through the interlocking, and 30 miles per hour on the connecting track. There was considerable fog in the vicinity of Nichols at the time of the accident, and visibility was restricted to about 500 feet. Under this signal arrangement, if the speed of the train was not reduced in conformity with the speed-limit sign, as in this case, safety of the movement depended upon the ability of the employees on the engine to see the indication displayed by the home signal in time to take necessary action to reduce the speed sufficiently for safe movement on the diverging route. If the approach signal had been arranged to display a warning indication that the route was lined for the connecting track, the speed could have been reduced sufficiently within the distance of 4,193 feet between the approach signal and the west switch of the connecting track for the train to move safely over the connecting track.

#### Cause

It is found that this accident was caused by excessive speed on a curve.

#### Recommendation

It is recommended that the St. Louis-San Francisco Railway Company provide an indication on signal 18L for east-bound movements to the connecting track at Nichols.

Dated at Washington, D. C., this fourth day of December, 1947.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,  
Secretary.