Inv-2068

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE

ATCHISON, TOPEKA & SANTA FE RAILWAY

LAWRIE, OKLA.

MAY 30, 1936

INVESTIGATION NO. 2068

SUMMARY

Railroad:	Atchison, Topeka & Santa Fe
Date:	May 30, 1936
Location:	Lawrie, Okla.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	No. 5
Engine number:	3451
Consist:	12 cars
Speed:	35-40 m.p.h.
Track:	6° curve
Weather:	Clear
Time:	5:05 p.m.
Casualties:	2 killed; 18 injured
Cause:	Broken rail

July 8, 1936.

To the Commission:

On May 30, 1936, there was a derailment of a passenger train on the Atchison, Topeka & Santa Fe Railway at Lawrie, Okla., which resulted in the death of 2 express messengers and the injury of 18 passengers.

Location and method of operation

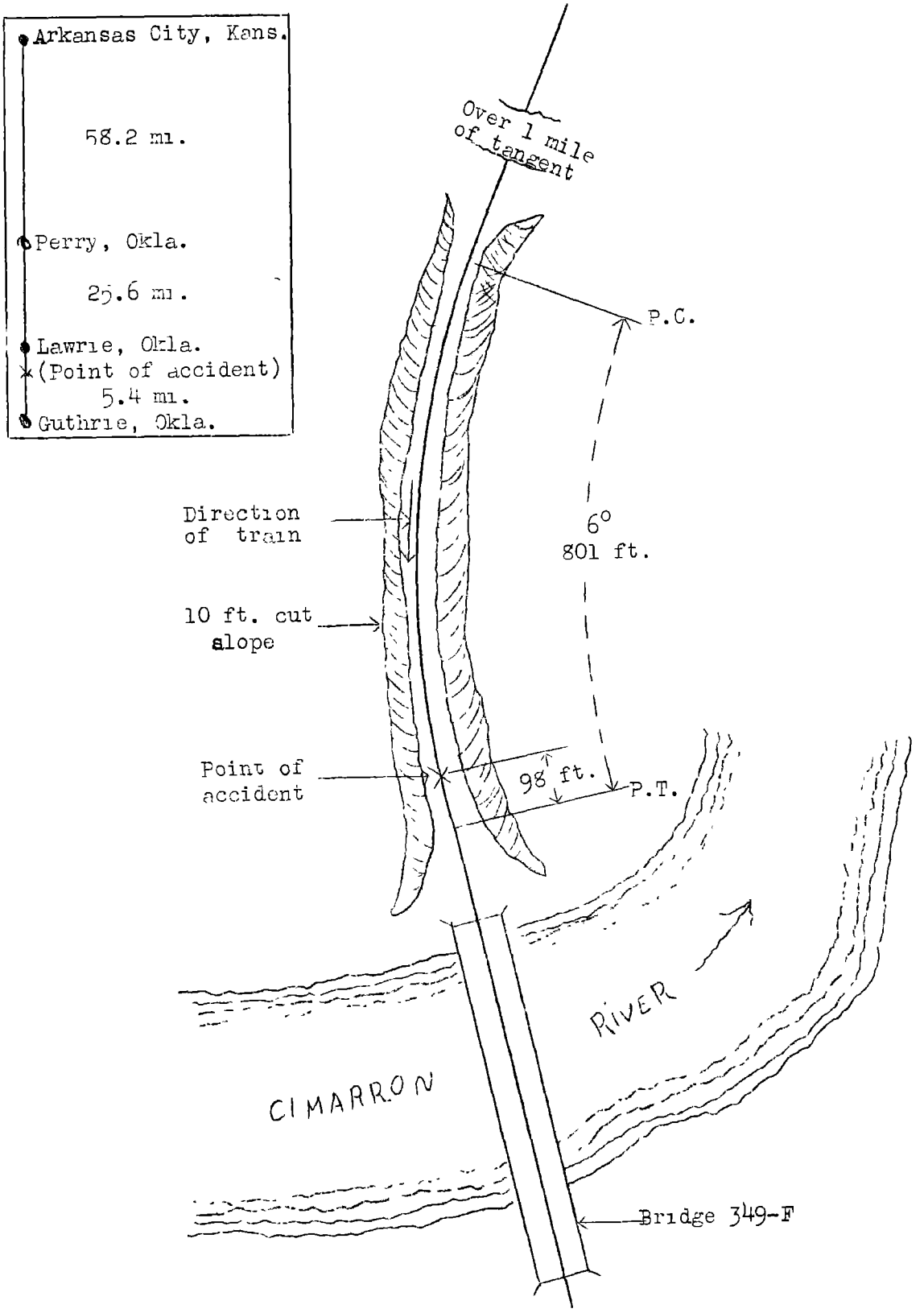
This accident occurred on the First District of the Oklahoma Division, extending between Arkansas City, Kans., and Guthrie, Okla., a distance of 89.2 miles; in the vicinity of the point of accident this is a single-track line over which trains are operated by time table, train orders and an automatic block-signal system. Time table directions are used in this report. The derailment occurred at a point approximately 2.58 miles west of the station at Lawrie, at the leaving end of a 6° curve to the left, just east of bridge 349-F. Approaching the point of derailment from the east the track is tangent for more than a mile, followed by a 6° curve to the left 801 feet in length, not including spirals, the accident occurring on this curve at a point 98 feet from its western end and 203 feet east of bridge 349-F. This bridge spans the Cimarron River and is a ballast-deck girder bridge 748 feet in length, equipped with guard rails. The track is tangent across the bridge. The grade at the point of accident is 0.3 percent descending westward.

The track is laid with 90-pound rails, 33 feet in length, with an average of 22 treated ties to the rail length, fully tieplated, double spiked on the inside of each rail, with 6 rail anchors to the rail length, secured with reinforced angle bars, fully bolted and equipped with lock washers, and ballasted with crushed rock to a depth of 12 to 18 inches. The track is well maintained. The 6° curve involved has a superelevation of 6 inches and is laid in a cut about 10 feet in depth; the high rail was relaid in 1929, and the low rail in 1931. A permanent slow board, located 2,551 feet east of the curve, restricts the speed of passenger trains to 40 miles per hour on the curve.

Automatic block signals 3481 and 3471, governing westward movements, are located 5,091 and 10,670 feet, respectively, east of the point of accident.

The weather was clear at the time of the accident, which occurred about 5:05 p.m.

Inv. No. 2068
Atchison, Topeka & Santa Fe Ry.
Lawrie, Okla.
May 30, 1936



Description

Train No. 5, a west-bound passenger train, consisted of 1 mail-baggage car, 2 baggage cars, 1 coach, 3 chair cars, 1 Pullman sleeping car, 1 dining car, 1 lounge car, 1 Pullman sleeping car and 1 Pullman observation car, in the order named, hauled by engine 3451, of the 4-6-4 Pacific type, and was in charge of Conductor Rockhold and Engineman Roche. The cars were of all-steel construction, with the exception of the second and third cars, which were of steel-underframe construction. This train left Perry, 25.6 miles east of Lawrie, and the last open office, at 4:31 p.m., according to the train sheet, 48 minutes late, passed automatic signals 3471 and 3481, both of which were displaying proceed indications, and was derailed by a broken rail while traveling at a speed estimated to have been between 35 and 40 miles per hour.

The engine, tender, first six cars and the forward truck of the seventh car were derailed; the engine, tender, and first car remained coupled and stopped on the ties of the bridge, with the front end of the engine 577 feet west of the point of derailment, and the left wheels between the guard rail and the running rail. The first car was separated from the second car a distance of 28 feet, and the east end of the latter car extended over the north side of the bridge; the third car fell in the river on the north side of the bridge, and rested on its right side practically submerged; the fourth car extended over the east abutment of the bridge, leaning toward the right, on the north side of the track; the fifth and sixth cars stopped in the west end of the cut, leaning toward the right, and the seventh car stood upon the broken rail.

Summary of evidence

Engineman Roche stated that his train was making practically running time and that approaching the curve he reduced speed in accordance with requirements. Just after he released the brakes at the resume speed board near the leaving end of the curve, and while running at a speed of about 35 miles per hour, he felt the engine suddenly drop as though a rail had broken; there was no rolling of the engine or any rough spot encountered in the track, nor any other indication of derailment prior to the accident. He immediately applied the air brakes in emergency and closed the throttle and the train stopped very quickly. About 40 minutes after the accident he saw a broken rail on the outside of the curve; however, he did not examine this rail closely. He saw no indication of dragging equipment, and he thought that the lead pony truck wheels were the first to become derailed. Westward automatic signals

3471 and 3481 were displaying proceed indications as his engine passed them, and after the accident signal 3481 was displaying a red indication behind the train. The air brakes were tested and worked properly en route.

Fireman Burkarth made statements as to what transpired similar to those of Engineman Roche; the fireman thought that the outside rail of the curve gave way, saying that the engine appeared to lurch toward the right and drop off the rail, and that it seemed to him as though the rear end of the engine was the first to be derailed, although that end might have been crowding to the right; he estimated the speed to have been about 40 miles per hour when the accident occurred and said the speed restrictions on the curve were not exceeded. There was nothing about the condition of the engine that would have caused or contributed to the accident, and there was no unusual rolling of the engine or tender prior to the accident.

Conductor Rockhold, Brakeman Smith and Porter Williams were not aware of anything wrong before the accident occurred. Conductor Rockhold observed that an application of the air brakes was made approaching the curve, and the speed was reduced to less than 40 miles per hour on entering the curve, which permitted the train to ride smoothly. After the accident he saw a broken rail which he thought had failed under the engine and was the cause of the accident. Brakeman Smith went back to flag immediately after the accident and inspected the track as he went, but found no indication of dragging equipment; he proceeded east of signal 3481 and that signal was displaying a stop indication behind the train at that time.

Division Engineer Frailey arrived at the scene of the accident about 11:15 p.m. and inspected the track before the equipment was moved; marks on the rail and ties indicated that the derailment occurred at the break in the rail. The base of the rail was broken, indicating that when the break occurred, the end of the rail moved outward allowing the driving wheels to drop to the base of the rail and that the equipment followed this rail, plowing out the right rail of the curve to the point where the engine stopped on the bridge. Wheel marks appeared between the running rail and the guard rail on the left side; the left rail was not materially disturbed between the point of derailment and the end of the bridge, but from that point westward the guard rail and both running rails were badly damaged to the point where the engine stopped. When the engine became derailed, the outside rail of the curve was loosened for a distance of 53 feet east of the break, at which point the first marks appeared on the ties and on the base of the gauge side of the low rail; the right wheels apparently rode on the base of the right rail for most of this distance. After the wreckage

was cleared, three pieces of the broken rail were recovered, totaling 28 feet 4½ inches in length, but the remaining portion of the leaving end of the rail, measuring 4 feet 7½ inches, could not be found. The break that caused the derailment was a new, even, perpendicular break, which occurred at a point 12 feet 7 inches from the receiving end, of an outside rail of the curve; the base of the gauge side of the rail also showed ragged breaks which started at a point 6 feet 10 inches from the receiving end of the rail and extended westward for a distance of approximately 15 feet 6 inches. He thought that these breaks occurred as a result of the derailment, and were apparently due to the wheels dropping onto the base of the rail. It was necessary to cut the rail with an acetylene torch at a point 8 feet 8½ inches west of the point where the break occurred, while clearing the wreckage; the piece west of this cut measured 7 feet 1 inch in length and was broken at the west end, this break also being a new, perpendicular break. The balance of the rail, representing 4 feet 7½ inches of the leaving end, could not be found and it was impossible to determine whether this portion broke at the time of the derailment or occurred during wrecking operations. The track was in good condition, well maintained, and proper as to alignment, gauge, cross levels and surface. Rail detector car A.T.& S.F. No. 1 was operated over this section of track on May 16, 1936.

Roadmaster Kelley said that he accompanied the rail detector car on May 16, but no defective rails were found on this curve or in the vicinity of the cut. The curve was last lined and spotted on May 21, 1936, and had required no unusual care to maintain in the past. He was over this track on May 26, and made a personal check of this curve and found it to be in good condition; he also rode over it on east-bound passenger Train No. 26 on May 28, and noticed no unusual condition, the train riding comfortably around the curve.

Road Foreman of Engines Payden rode engine 3450 on west-bound passenger Train No. 5 over this track on May 29, the speed through the cut being between 35 and 40 miles per hour; nothing wrong was noticed with track conditions at that point and the engine rode smoothly around the curve. On May 30 he rode through this cut on Train No. 26, and noticed nothing wrong with track conditions. He had ridden frequently with Engineman Roche and had always found him to comply strictly with speed restrictions. In company with General Foreman Simpson, he made a personal inspection of engine 3451 after it was re-railed and taken to Guthrie, but no defect was found that would have caused or contributed to the accident. Mr. Payden thought that the accident was caused by the broken rail.

General Car Foreman Bodle made a careful inspection of the track and equipment; all wheel flanges were found to be in good condition, and there was no indication of dragging equipment, nor was any defect found that would have contributed to the accident; in his opinion the accident was caused by the rail breaking under the engine.

Signal Supervisor Cotton tested the signal system after the accident and found it to be in proper working order.

Engineer of Tests Chapman reported that his examination and test of the broken rail indicated that the rail broke and overturned under the locomotive. This was a 90-pound rail, mill marked OH 9021 - I.S.Co. Gary Wks., X 1909, Heat 56320, Rail E. The rail was broken in two places and a portion of the leaving end, about 4½ feet long, was lost in the accident. During the derailment the inside edge of the base was broken by passing wheels for a considerable portion of its length. At the juncture of the base and the fin extending from the fracture, there was an original progressive fracture about 7/32 inch in depth from a seam, which was considered as the origin of the first break in this rail, and there were indications of considerable segregation in the rail, which tended to a considerable extent, to cause the breaking up of the flange. There was also considerable segregation at the second break and the metal at the edge of the flange of the base on the gauge side showed cracks, indicating that the ingot had probably been overheated while in the soaking pits. The location of the first break was approximately 7/8 inch from a tie plate, and the bottom of the base of the rail at the point of fracture, showed considerable corrosion. The chemical analysis of the rail is as follows:

	Percent	
	O	M
Carbon..	0.74	0.75
Manganese.....	0.92	0.92
Phosphorus... ..	0.029	0.032
Sulphur..	0.050	0.049
Silicon.	0.18	0.17

It was his conclusion that the failure originated at a seam in the base of the rail, and was probably augmented by the condition at edge of the base on the gauge side, which showed cracks indicating defective material at other places along the edge.

The Commission's inspectors made a careful examination of the track and equipment after the accident, and found conditions to be practically as described by others and indications that the accident was caused by a broken rail. There were no marks on the ties outside the high rail of the curve opposite the broken rail; the indications were that when the rail broke, the engine and tender dropped inside the high rail, forcing it outward and turning it over behind the initial break, which caused the wheels of the cars to ride the web and base of the rail. A slot 2 inches deep and 3¾ inches wide was burned in the cross member of the trailer truck of the engine, this burn being caused by the truck frame riding on the rail after the engine was derailed. There was no indication of anything dragging, and nothing was found about the track or equipment that would have caused the accident, nor was there anything to indicate that speed was a factor. The last previous train to pass over the point where the accident occurred was a west-bound freight train, which passed that point about 3:10 p.m., but no report was made of anything wrong by members of that crew.

Discussion

The investigation developed that the accident was caused by a broken rail on the outside of the 6° curve to the left, in the cut just east of bridge 349-F. Apparently the rail broke and overturned under the engine, allowing the wheels on the right side of the engine to drop inside, and upon the base of the rail, resulting in the base of the rail being irregularly broken for a considerable portion of its length. The initial break occurred at a point 12 feet 7 inches from the receiving end of the rail, and was a new, perpendicular fracture. A rail detector car had been operated over this section of track on May 16, 1936, but no defective rails were found on this curve or in the vicinity of the cut. Examination and test of the broken rail, made by the engineer of tests of this railroad, disclosed that the failure originated at a seam in the base of the rail, probably augmented by the condition at the edge of the rail base on the gauge side, which at other places showed cracks indicating defective material.

Conclusion

This accident was caused by a broken rail.

Respectfully submitted,

W. J. PATTERSON,

Director.