

INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE
INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON
THE PENNSYLVANIA RAILROAD AT BRISTOL, PA., ON
MARCH 13, 1931

April 17, 1931.

To the Commission:

On March 13, 1931, there was a derailment of a passenger train on the Pennsylvania Railroad at Bristol, Pa., resulting in the injury of 25 passengers.

Location and method of operation

This accident occurred on the New York Division, extending between Holmes, Pa., and New York, N. Y., a distance of 78.4 miles, in the vicinity of the point of accident this is a four-track line, electrified, over which both steam and electric trains operate by timetable, train orders, and an automatic block-signal system. In this territory installations have been made for the operation of engines equipped either with cab signal and automatic train-stop apparatus, or with cab signals only. The steam engine involved was equipped with cab signal, whistle and acknowledger, but not with train-stop apparatus. The tracks are numbered from south to north, 1, 2, 3, and 4, and the accident occurred on track 1, the initial point of derailment being 3,000 feet west of Bristol passenger station, while the final point of derailment was about 1,325 feet east of the station. Approaching the initial point of derailment from the west, the track is tangent for a distance of 3,700 feet, and then there is a $0^{\circ} 25'$ curve to the left 4,848 feet in length, and about 2,250 feet of tangent, followed by a $0^{\circ} 45'$ curve to the left over 2,500 feet in length. The initial point of derailment was on the $0^{\circ} 25'$ curve at a point 2,888 feet from its western end, while the final point of derailment was about 4,385 feet beyond, on the $0^{\circ} 45'$ curve east of the intervening tangent. The grade at the initial point of derailment is level.

The track is laid with 130-pound rails, 39 feet in length, with an average of 23 treated ties to the rail-length, fully tie-plated, with three spikes to the tie-plate, and ballasted with broken stone to a depth of 2 feet, four-pole angle bars are used. The track and road-bed were well maintained.

The weather was clear at the time of the accident, which occurred about 9.34 p. m.

-2-
4
5
2
1

To tangent
3,500 ft.

* Final point of
derailment

P.C. $0^{\circ}45'$ curve

Jefferson Ave.

Inv. No. 1696
Pennsylvania R.R.
Bristol, Pa.
March 10, 1931.

1325 ft.

Platform
Station

Bristol

2250 ft.

3060 ft.

P.T. $0^{\circ}25'$
curve

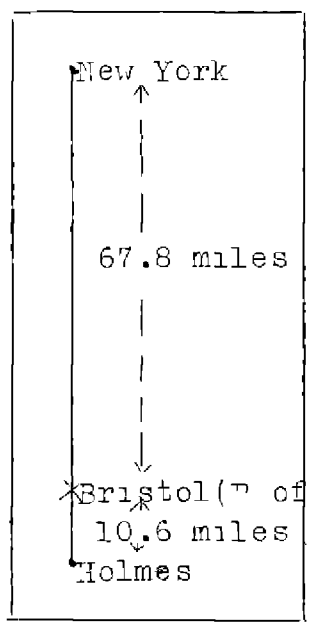
4848 ft.

* Initial point of
derailment

Signal Bridge No. 67.1

2888 ft.
to tan

Water pans



Description

Eastbound passenger train No. 230 consisted of one deadhead mail-storage car, two baggage-express cars, four coaches, one dining car, two parlor cars, and one club car, in the order named, all of steel construction, hauled by engine 3754, class K4sa, and was in charge of Conductor Walton and Engineman Kenna. This train passed Holmes, 10.6 miles west of Bristol, at 9.23 p m , on time, and on reaching a point approximately 700 feet east of the water pans at Bristol, it was derailed while traveling at a speed estimated to have been between 50 and 70 miles per hour.

Engine 3754 and its tender were not derailed; they broke away from the cars and came to a stop with the front end of the engine at a point about 1,050 feet east of where the derailed cars came to rest. The first seven cars and the forward truck of the eighth car were derailed and headed down the embankment, which is about 20 feet in height at the final point of derailment, the most easterly car of the derailed train, namely, the second car, coming to rest with its front end about 4,385 feet east of the initial point of derailment. The third car was behind the second car and at right angles to the tracks. The fourth, fifth, sixth, seventh and eighth cars remained in line, with the front end of the fourth car at the bottom of the slope and the rear truck of the eighth car on the track. The first car was parallel with and to the right of the fourth and fifth cars.

Summary of evidence

Engineman Kenna stated that just after passing over the water pans at Bristol, he and Fireman Bell called the clear indication displayed on the signal bridge located about 250 feet east of the water pans. Engineman Kenna then looked at his watch, and on putting it back in his pocket he heard an unusual noise, when about opposite the platform at Bristol passenger station, as though something was dragging, possibly brake rigging. He looked down to see whether there was any fire flying, and on looking back he saw the first car projecting out to the right of track 1, and immediately applied the air brakes in emergency. Engineman Kenna said that he had not felt any unusual motion, that steam was being worked, and that the speed of his train was between 65 and 70 miles per hour. The cab signals functioned properly, as had the automatic signals, and he had a clear indication

when he made the emergency application, the cab signals giving no indication of any change in track conditions at the initial point of derailment. After the accident he inspected the engine, but found no parts to be missing; the air brakes had been tested at Philadelphia and worked properly en route, no trouble being experienced in making stops at 30th Street and North Philadelphia, while the headlight was burning brightly approaching Bristol. Fireman Bell gave testimony substantially the same as that of Engineer Kenna, except that the first he knew of anything wrong was when the engineer applied the brakes in emergency, about at the east end of the station at Bristol.

Conductor Walton, Head Brakeman Beggle, Flagman Rue and Express Messenger Hasset, all of whom were riding back in the cars of the train, were unaware of anything wrong prior to the accident. The conductor and head brakeman were riding in the fourth car, just after passing over the water pans at Bristol the conductor started to look out the door on the north side at the rear end of the car, at which point he usually makes an inspection of his train, but as he went to open the door he heard a noise, apparently caused by flying ballast, and immediately afterwards the air brakes applied, about at Bristol passenger station. The brakes apparently started to apply in service, but at once went to emergency. The conductor estimated the speed of his train to have been about 60 miles per hour, while the head brakeman and the express messenger estimated it to have been between 50 and 60 miles per hour. The express messenger was riding in the second car, he heard a thumping under his car, saying that such an occurrence often happens when a lump of coal bounces up and strikes the bottom of the car, and at first he thought that was what had happened, however, immediately afterwards the air brakes applied and then the derailment occurred. The head brakeman and the flagman had looked out and inspected the train at points 5 and 8 miles, respectively, west of Bristol, but noticed nothing wrong.

Statements of Conductor Patton, Baggage Master Grady and Flagman Eachus, of electric train No. 106, the train that closely followed train No. 230, were to the effect that their train was brought to a stop over the water pans, at which time the wires were down. Later, their train proceeded at a low rate of speed to Bristol passenger station, passing over the initial point of derailment, and unloaded passengers at the station. Orders were received to back their train to Philadelphia, but after backing a short distance a stop was made until track men replaced a broken rail. They had not noticed anything in the riding of their train to indicate that

it had passed over a broken rail.

Train No. RJ-10 was the last train to use track 1 prior to the derailment, however, members of the crew of that train, as well as members of the crew of train No. 154, the second train ahead of train No. 230, noticed nothing unusual at the time their respective trains passed over the track where the accident occurred.

Division Engineer Swenson arrived at the scene of the accident just before midnight and on examining the track found where a piece had broken out of the receiving end of a rail on the high side of the curve, at a point about 700 feet east of the water pans. The portion which was broken loose came from within a rail joint and broke into two pieces, each triangular in shape. The fracture extended from a point in the web of the rail, about $1\frac{1}{2}$ inches above the base, diagonally through the first bolt hole, and thence upward in the same diagonal direction to the head of the rail. A second line of fracture was in the web and extended from the bolt hole back to the end of the rail. The two broken pieces fitted into the opening remaining in the broken rail, the length of the largest triangular piece measured along the head of the rail from its receiving end to the point of fracture was only $5\frac{3}{4}$ inches. The joint is spanned by bond wires, so that the flow of current through the rails was not disturbed by the break, therefore, it had no effect upon the automatic block signals or the cab signals. The first clearly defined mark of derailment was on a bolt hole in the next rail joint east of the broken rail and on the opposite side of the track, on the gauge side of the low rail of the curve, beyond which point there appeared to be distinct flange marks on the ties, made by one pair of wheels. Division Engineer Swenson examined the track for a distance of about one-half mile west of the broken rail, but found no marks to indicate that anything had been dragging, he was unable to state positively that the broken rail in itself caused the derailment, but did not know of anything else that would have contributed to the derailment in any way.

Supervisor of Track Filippelli arrived at the scene of the accident within an hour after its occurrence; his examination of the track disclosed conditions to be practically as stated by Division Engineer Swenson. Supervisor of Track Filippelli noticed the flange marks about half a rail-length east of the broken rail, referred to by Division Engineer Swenson, and also said that there was a mark about 5 feet long on the outside edge of the head of the broken rail, and that farther eastward there were marks indicating that two pairs of

wheels had been derailed, these marks continuing as far as Jefferson Avenue. At the bridge over Jefferson Avenue, about 700 feet east of the station and just west of where the derailed cars came to rest, the wheels struck the end of the guard rail, while some portion of the equipment struck the southwest corner of the bridge. The rails on the bridge had been knocked out of line and when the cars went down the bank east of the bridge, they took that portion of the track with them. Supervisor of Track Filippelli stated that although train No. 156, the electric train which followed train No. 330, had pulled up to Bristol passenger station and in so doing had passed over the broken rail, nevertheless he issued instructions to change the rail, as he did not want the train to move over the broken rail again on its back-up movement to Philadelphia. The surface of the fracture had not been battered to any extent. He said that the superelevation of the 0° 25' curve where the broken rail was found is $1\frac{3}{4}$ inches. The last time he was over this piece of track prior to the derailment was on March 11, at which time he made the ordinary general track inspection, which included looking for fractured rails or other track defects, but everything was found to be in good condition. He further stated that on August 5, 1930, the Sperry detector car was run over this piece of track, but no indication of any defect in the track was reported.

Track Foreman Fuoco stated that he arrived at the scene of the accident about 10 p.m., and on examining the track he saw where the rail was broken, however, it was dark and he did not examine the break closely. He also walked westward as far as the water pans, but found no marks of any kind. He was last over the piece of track where the accident occurred during the afternoon of March 14, but found nothing wrong with track conditions, while Section Laborer Kocerl had walked over track 1 from Bristol station to the water pans, westward, on March 16, the day of the accident, starting from the tool house at 7 a.m., but did not find anything wrong, saying that everything appeared to be in excellent condition.

The first mark of derailment was a flange mark on a bolt in the first rail joint east of the broken rail, on the gauge side or the low rail, this being on the opposite side of the track from the broken rail and 19 feet east thereof. From this point eastward, the marks on the ties on the left side varied between the north rail and the center of the track, apparently caused by the wheel flanges of a derailed truck, and the guard rails at the railroad bridges over the various streets in Bristol pulled the track back towards the north rail.

The derailed truck damaged the end of the platform on the south side of track 1 at Bristol passenger station and struck the concrete encased girder on the south side of the track at Jefferson Avenue, located about 700 feet east of the station, with such force that it threw the truck back towards the north rail and tore out the bridge guard rail along the south rail. The equipment started to leave the roadbed on the east side of Jefferson Avenue bridge.

Inspection of the track for a distance of about 1 mile west of the point of accident, as well as measurements made of the gauge, cross levels and alinement for a distance of 56 feet east of the broken rail and 495 feet west thereof, disclosed the track to be in good condition. The maximum variation of the gauge from standard, taken at 11-foot intervals, at joints and intermediate points, was found to be one-eighth inch, while cross levels disclosed that there was no variation from the fixed superelevation of $1\frac{3}{4}$ inches, in excess of three-sixteenths inch. The alinement also was well maintained.

Careful inspection of the engine and derailed cars failed to disclose any defect that would have caused or contributed to the accident.

Conclusions

This accident apparently was caused by a broken rail.

The fracture was at the receiving end of a 130-pound rail, within the limits of a rail joint. The rail involved was rolled in February, 1926, P. S. O. H., Steelton, heat No. 82108 C-9, and was laid in the track during March, 1926, on the south side of track 1, the high rail of the curve. There were two small pieces broken out, both triangular in shape; one line of fracture extended from the web of the rail, about $1\frac{1}{2}$ inches above the base, diagonally upward through the first bolt hole to the head of the rail, and the other extended through the upper part of the web, from the bolt hole back to the end of the rail. The broken triangular pieces fitted into the opening remaining in the broken rail, and the largest triangular piece measured along the head of the rail was only $5\frac{1}{4}$ inches in length. The entire fracture appeared to be new, with the exception of that portion extending from the web of the rail, at a point $1\frac{1}{2}$ inches above the base, to the first bolt hole, which showed slight discolorations. There was no visible evidence of any defect in the rail.

All of the employees involved were experienced men and at the time of the accident none of them had been on duty in violation of any of the provisions of the hours of service law.

Respectfully submitted,

W. P. BORLAND,

Director.