

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE
PENNSYLVANIA RAILROAD

MORRISVILLE, PA.

MARCH 24, 1937

INVESTIGATION NO. 2165

SUMMARY

Inv-2165

Railroad:	Pennsylvania
Date:	March 24, 1937
Location:	Morrisville, Pa.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	First 112
Engine number:	4801 (electric)
Speed:	40-50 m.p.h.
Track:	0° 35' curve
Weather:	Clear
Time:	7:50 a. m.
Casualties:	6 injured
Cause:	Metallic steam heat connector broke from steam line and lodged in heel block of trailing-point switch.

June 9, 1937

To the Commission:

On March 24, 1937, there was a derailment of a passenger train on the Pennsylvania Railroad at Morrisville, Pa., which resulted in the injury of 4 passengers and 2 employees.

Location and method of operation

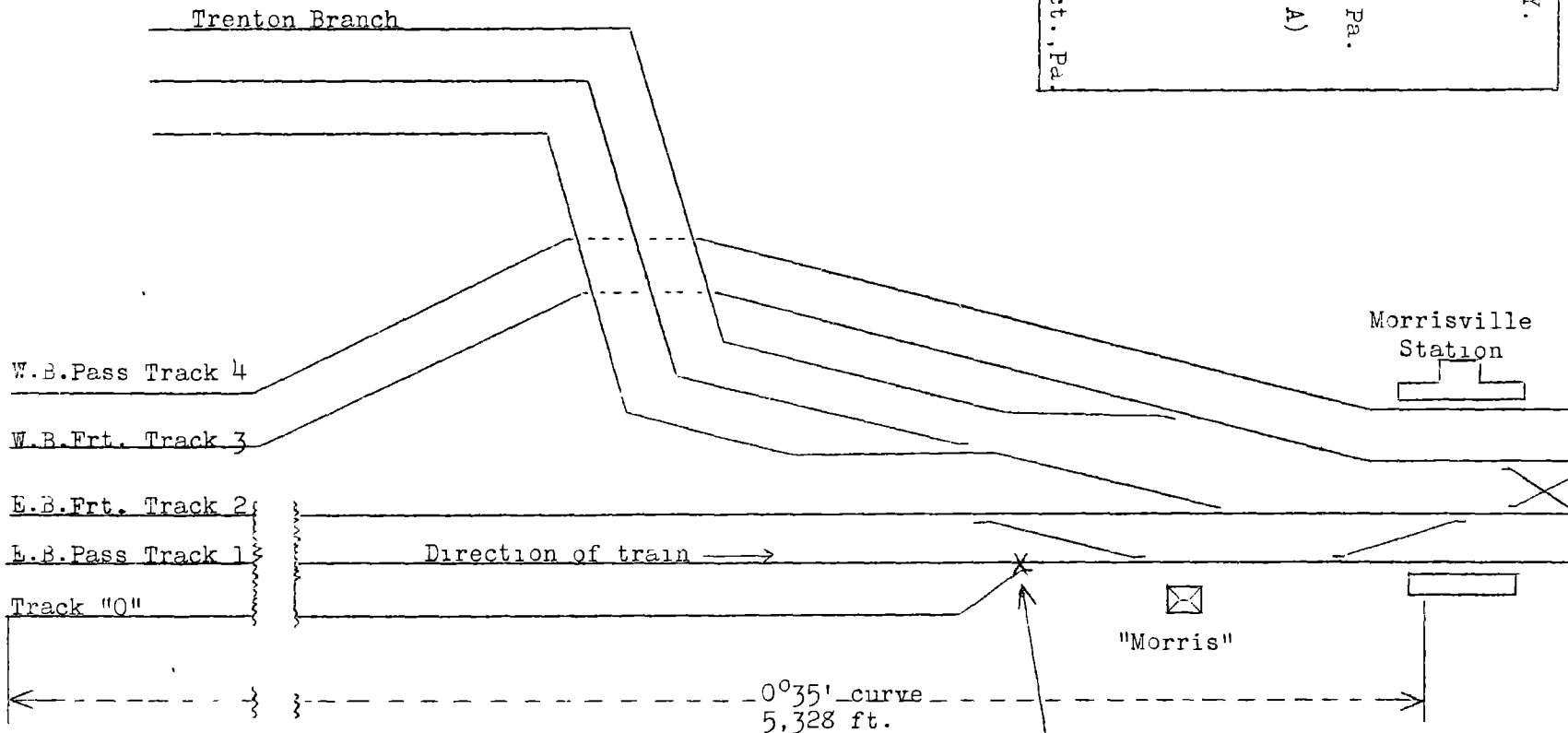
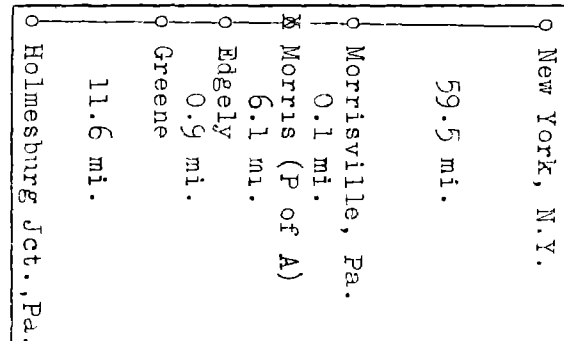
This accident occurred on that part of the New York Division extending between Holmesburg Junction, Pa., and New York, N. Y., a distance of 78.2 miles; in the vicinity of the point of accident this is a 4-track line over which both steam and electric trains are operated by timetable, train orders and an automatic block and cab signal system.

The accident occurred within the limits of Morris interlocking plant, where the Trenton cut-off joins the New York Division main line, at a point 252 feet west of the interlocking tower. Four main tracks of the New York Division extend through the plant, as follows:

Track 1	-	used	by	east-bound	passenger	trains
"	2	-	"	"	freight	"
"	3	-	"	west-bound	freight	"
"	4	-	"	"	passenger	"

A fifth track, designated "0" track, approaches the plant from the west paralleling track 1 on the south and converges with track 1 through interlocked switch No. 20, a No. 10 turnout, at a point 243 feet west of the interlocking tower and 355 feet west of a bridge spanning Pennsylvania Avenue. Approaching from the west the track is tangent for almost 1 mile, followed by a 0° 35' curve to the right 5,328 feet in length, the accident occurring on this curve at a point about 720 feet from its eastern end. The grade is 0.34 percent ascending eastward at the point of accident.

The track is laid with 130-pound rails, 39 feet in length, with 22 ties to the rail-length, single-spiked, fully tieplated, ballasted with trap rock to a depth of 3 feet, and well maintained. At a signal bridge located approximately 1.8 miles west of Morris tower, dragging-equipment detectors are installed on eastward tracks 1 and 2. When the device is actuated by dragging equipment the cab signals indicate caution-



-B-

Switch 20
Point of
accident

Inv. No. 2165
Pennsylvania R.R.
Morrisville, Pa.
March 24, 1937

slow-speed and the most favorable indication on fixed signals between the location of the device and the interlocking, is "approach". The maximum authorized speed for passenger trains in this vicinity is 75 miles per hour.

The weather was clear at the time of the accident, which occurred about 7:50 a.m.

Description

Train First No. 112, an east-bound passenger train, consisted of 2 box cars adapted to passenger train service, 1 baggage car, 4 coaches, 1 diner and 3 Pullman sleeping cars, in the order named, all of steel construction, hauled by electric locomotive 4801, and was in charge of Conductor Mulherin and Engineman Nally. This train, operating on track 1, passed Greene, the last open office, 7 miles west of Morris, at 7:44 a.m., according to the train sheet, 1 minute ahead of time, and was derailed at Morris tower while traveling at a speed estimated to have been between 40 and 50 miles per hour.

Locomotive 4801 was not derailed but became uncoupled and stopped about 1,675 feet east of the point of derailment, 740 feet in advance of the rest of the train. The first 6 cars and the forward truck of the seventh car were derailed. During the course of the derailment, the first car struck and bent a steel power-line pole, and then demolished a portion of the interlocking tower, after which it stopped on the embankment just west of Pennsylvania Avenue bridge. The balance of the train continued eastward about 565 feet and stopped with the second car across tracks 2 and 3, and the other derailed cars were upright and in line with track 1. The employees injured were the block operator and a signalman who were in the tower.

Summary of evidence

Engineman Nally and Fireman Harding of Train No. 112 stated that the cab-signal apparatus and the air brakes were tested at Washington, D. C., and worked properly enroute. Approaching Morris tower their train was following a local; the distant and home signals at Morris were displaying approach-restricting indications, and while drifting around the curve prior to the accident, the speedometer showed a speed of between 40 and 45 miles per hour. The first intimation they had of anything wrong was when the air brakes were applied in emergency, due to the train parting as a result of the derailment. Neither noticed any defect of the steam heat parts, nor steam escaping between the cars, at any time prior to the accident. The maximum steam-heat pressure used on the trip was 140-pounds, and 72-pounds pressure

was being utilized when the accident occurred. After the accident the engineman examined the locomotive and saw that the gasket from the steam-heat coupling was missing. The fireman also saw this condition, and also noted a part of the steam connector wedged between the north rails of trailing-point switch 20.

Conductor Mulherin, Baggage-master Keller, Head Brakeman Mullineaux and Flagman Funk were not aware of anything wrong until the accident occurred. Their estimates of the speed at the time of the derailment were from 40 to 50 miles per hour. The flagman immediately went back to protect and at that time the signals behind his train were displaying stop indications. The conductor and the head brakeman saw part of the metallic steam-heat connector lodged in the heel of the switch and also noted that it had been run over by a wheel flange. Prior to departing from Washington, D. C., the car inspector twice reported the air brakes and steam line as being all right; while rounding curves and at stops made en route both sides of the train were inspected but nothing wrong was observed. The flagman said that he opened the valve of the steam heat line and blew out the condensation at Edgely, 6.1 miles west of Morris, at which time normal steam pressure was escaping at the rear of the train; consequently, he knew that the steam train line was intact at that time.

Conductor Landis and Brakeman Groff, of Train ET-2, which was standing on the east-bound freight track of the Trenton cut-off at the time of the accident, stated that when Train First No. 112 approached at a speed of about 50 miles per hour they observed steam escaping from a bad leak which seemed to be between the motor and the first car. Nothing was heard or seen to be dragging, however, and no dust or sparks were evident, but at switch 20 the cars started to derail. After the accident they saw part of a steam-heat connector wedged between the rails of the switch. The flagman inspected the track west of the switch for a distance of about 8 or 10 car lengths, but found no indication of dragging equipment.

Block Operator Bellings, at Greene, gave Train First No. 112 a running inspection as it passed his tower, and Track Foreman Fareno looked it over from the point where he was working, about 3 miles west of Morris, but neither of these employees noticed anything unusual when the train passed their respective locations.

On March 20, Section Foreman Mara last checked the gauge at the heel of switch 20, and for a distance of about two rail lengths west thereof and found it standard at all points. After the accident he saw the connector wedged between the rails at the north switch point, but as the outside spikes had not been loosened he knew that the track gauge had not been disturbed.

Track Supervisor Clutz also made an examination of track conditions in the vicinity of the point of accident, and stated that starting at a point approximately 4200 feet west of the point of derailment there were several marks in the ballast between tracks 1 and 2, and the south rail of track 2 had been struck several times; there were also marks on ties and marks showing where an elliptical car-spring which was found lying between tracks 1 and 2, had been dislodged from the train. At a point 10 feet west of the heel-block on the north side of the north turnout rail of the switch there were gouge marks apparently made by a disconnected metallic steam-hose connector when it struck the outer rail of the curve lead and was dragged along until it became wedged in the heel-block of the switch. The gauge side of the base of the north main track rail was marked starting at a point 4 feet west of the obstruction, and spike heads were marked and some were broken off. Eastward therefrom and between the heel block and switch point, a distance of 18 feet, there were light flange marks on top of the rail head, and 6 feet east of the switch point there were flange marks on spike heads and ties. Marks also appeared on the frog, heel-block, and guard rail of a cross-over switch at a point 68 feet farther east, as well as on a bond wire 12 feet eastward and then there were double wheel-flange marks on ties starting 30 feet beyond and running eastward.

The statements of Master Mechanic Bickley and M. E. Foreman Wyrough agreed with that of Track Supervisor Clutz regarding track conditions in the vicinity of the point of accident, and the finding of the car-spring at a point some distance west of the interlocking plant. Master Mechanic Bickley further stated that a test was made with a box car similar to car 2116 and it was found that there was no appreciable difference in the height of the car with one spring removed. In his opinion the parting of the steam connectors was caused by the nipple with the pipe sleeve becoming disconnected from the steam train line on the east or B-end of car 2116, due to the pipe sleeve being improperly screwed to the steam line, and the absence of a clamping U-bolt to hold the nipple secure on its bracket. All of these employees were of the opinion that the accident was caused by the metallic connector becoming lodged in the heel of the switch.

Supervisor of Telegraph and Signals Kirsch stated that there was nothing about the condition of the interlocking plant that in any way contributed to the accident.

Car Inspector Norris stated that he inspected the cars which were picked up at Washington, and that he made steam couplings between the three head cars and motor, tested the brakes and circulated steam. No trouble was experienced in coupling the steam heat connectors. After all couplings had been made a test using a steam pressure of 140-pounds failed to disclose any steam

2165

leak or any sign of the metallic steam connector backing off at pipe threads, only a small number of threads being exposed where it was secured to the end steam valve. The metallic connector-support springs were intact and in good condition and he did not observe any defects of any nature.

Examination at the scene of accident by the Commission's inspectors disclosed conditions to be similar to those previously described.

Box car 2116, which was the head car in Train First No. 112, is a 100,000 pounds capacity all steel car - P.R.R. class X29 - having a light weight of 45,800 pounds. It was adapted to passenger train service in November 1936 by equipping it with steam heat and air signal lines, adjustable side bearings, and trucks having one elliptical and one coil spring in each nest. The steam line is of heavy 2-inch pipe, having a 10-inch nipple extension at the A-end, which is attached directly to the main section of steam line with a 2-inch pipe coupling. The steam line extension at the B-end with the connector assembly was torn off the car, but, as reassembled, consisted of two short nipples and two pipe couplings, a total extension of about 12 inches. Inspection of these parts revealed that the thread on the end of the main section of the steam pipe had been screwed into the pipe coupling only about 2 or $2\frac{1}{2}$ turns and that this insecure and improper joining of the pipe had broken apart.

That part of the steam line which extends beyond the end of the car rests upon a horizontal steel bracket plate $\frac{1}{2}$ " by $2\frac{1}{2}$ " riveted to the flange of the channel center sill. Two holes are provided in the bracket plate to receive the two legs of a $\frac{1}{2}$ " U-bolt designed to be drawn snugly over the 2-inch pipe by nuts on the under side of the plate. No U-bolt was found on the B-end of the car, and it was evident that there had been none, since, due to using two short nipples in place of one 10-inch nipple, the coupling connecting the short nipple rested directly on the supporting bracket at the clamp location and the outside diameter of this coupling would not permit the application of the standard U-bolt required. The bottom of this extra coupling was worn smooth at the point of contact with the bracket, indicating that it had been free to move.

The arrangement for the steam line connection to an adjacent car consists of an end valve screwed directly on the end of the steam line extension nipple, and a metallic ball joint type of steam connector with wedge lock head. This total assembly weighs approximately 75 pounds. Examination of the broken steam connector torn from the car disclosed various scars and bruise marks and also what appeared to be flange marks. Inspection of engine 4801 revealed no damage or any condition which would have contributed to the failure of the steam line on car 2116.

Discussion

The evidence indicates that some time prior to the accident improper repairs had been made to the steam pipe arrangement on the B-end of car 2116, and that the defective work was not discernible by visual inspection, nor did the steam pressure in the pipe give indication of the resulting weakness until just before the derailment. Of itself this defective work might not have resulted in more than a separation of the steam line, but the omission of a clamp to secure the end of the pipe not only permitted a considerable movement of the end of the pipe, thus hastening the rupture, but it also permitted the entire connector assembly to drop when the rupture occurred. The connector dropped while the train was moving through the interlocking plant at Morrisville and had already passed the dragging equipment detector, and after dragging a short distance it lodged between the rail and heel of trailing point switch 20 in such manner as to form a derail for the wheels of the train. Apparently the north wheel of the first pair of wheels on car 2116 left the track first and precipitated the general derailment.

It appears that within a very short distance from the point of derailment the elliptical spring was thrown from one of the spring nests on the leading truck of car 2116 but there is no evidence to show that the loss of this spring had any direct bearing upon the accident, although it may have permitted greater vibration throughout the car and thus hastened the separation of the connector from the steam line.

Conclusion

This accident was caused by the metallic steam-heat connector on the forward end of the leading car dropping from the car and becoming wedged in the heel block of a trailing point switch, thus forming a derail.

Respectfully submitted,

W. J. PATTERSON,

Director.