

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2995
THE PENNSYLVANIA RAILROAD COMPANY
REPORT IN RE ACCIDENT
NEAR ROYALTON, PA., ON
MAY 27, 1946

SUMMARY

Railroad: Pennsylvania
Date: May 27, 1946
Location: Royalton, Pa.
Kind of accident: Derailment
Train involved: Passenger
Train number: Passenger Extra 3727 East
Engine number: 3727
Consist: 3 cars
Speed: Approximately 60 m. p. h.
Operation: Automatic block and cab-signal systems
Track: Double; 6° curve; level
Weather: Cloudy
Time: 2:52:30 p. m.
Casualties: 3 killed; 50 injured
Cause: Excessive speed on a curve on which track was not properly maintained

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2995

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

THE PENNSYLVANIA RAILROAD COMPANY

July 23, 1946.

Accident near Royalton, Pa., on May 27, 1946, caused by
excessive speed on a curve of which the track was
not properly maintained.

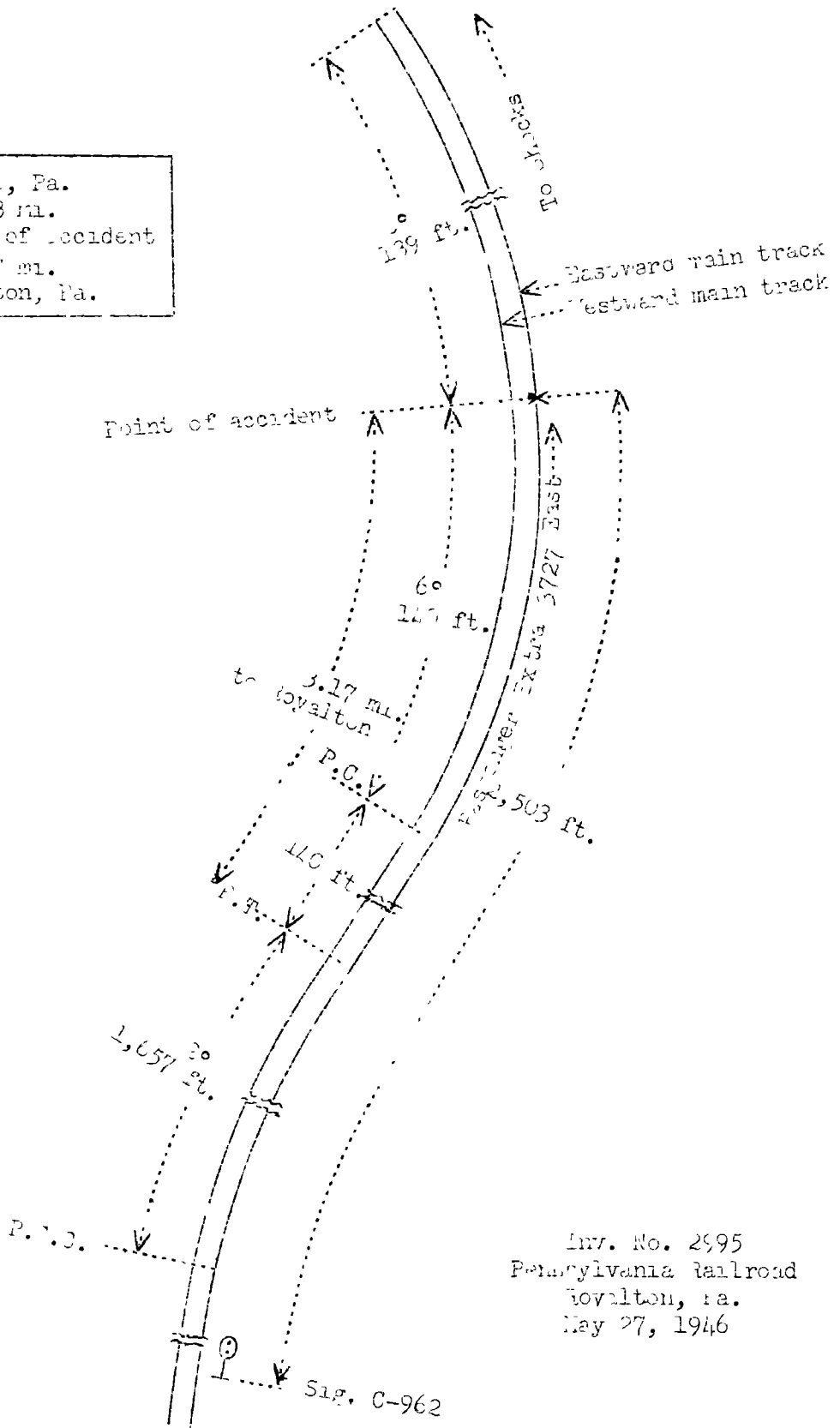
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On May 27, 1946, there was a derailment of a passenger train on the Pennsylvania Railroad near Royalton, Pa., which resulted in the death of 3 passengers and 1 train-service employee, and the injury of 43 passengers, 1 traffic representative, 1 Pullman porter, 3 train-service employees on duty and 2 train-service employees off duty. This accident was investigated in conjunction with a representative of the Pennsylvania Public Utility Commission.

¹Under 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.

○ Shocks, Pa.
8.43 mi.
X Point of accident
3.17 mi.
○ Roylton, Pa.



Inv. No. 2895
Pennsylvania Railroad
Roylton, Pa.
May 27, 1946

Location of Accident and Method of Operation

This accident occurred on that part of the Philadelphia Division extending between Royalton and Shocks, Pa., 11.6 miles, a double-track line, equipped with an overhead catenary system for the electric propulsion of trains. In the vicinity of the point of accident trains moving with the current of traffic are operated by automatic block-signal and cab-signal systems. The accident occurred on the eastward main track 3.17 miles east of the station at Royalton. From the west there are, in succession, a compound curve to the right 1,257 feet, the maximum curvature of which is 2° , a tangent 140 feet, and a curve to the left, the specified curvature of which is 6° , extending about 140 feet to the point of accident and about 139 feet eastward. The specified superelevation on the latter curve is 4-1/2 inches. The grade for east-bound trains is 0.13 percent descending 4,925 feet, then it is level 30 feet to the point of accident and 420 feet eastward.

On the curve on which the accident occurred, the track structure consists of 130-pound cropped rail, about 76 feet in length, laid on an average of 20 ties to the rail length. It is fully tieplated with double-shoulder tieplates, spiked with 5 spikes per tieplate, provided with 6-hole angle bars and an average of 8 rail anchors per rail length, and is ballasted with crushed stone to a depth of 12 inches. At the point of derailment the curvature was 3° , the superelevation was 2-1/8 inches and the gage was 4 feet 9 inches.

Automatic signal C-962, governing east-bound movements on the eastward main track, is 2,503 feet west of the point of accident. This signal is of the position-light type, and is continuously lighted. The cab signals are of the four-indication, position-light type.

Instructions governing the braking of passenger trains provide that when it is necessary to apply the train brakes to reduce the speed around curves, the reduction in speed must be made and the engine and train brakes fully released before the engine enters the curve.

The maximum authorized speed for passenger trains in the territory involved is 40 miles per hour.

Description of Accident

Passenger Extra 3727 East, an east-bound passenger train, consisted of steam engine 3727, a 4-6-2 type, one express-box car and seven sleeping cars, in the order named. All cars were of steel construction. This train departed from Royalton, the last open office, at 2:47 p. m., stopped for at least 10 seconds about 2,000 feet east of Royalton, passed signal C-962, which displayed proceed, and while moving at a speed estimated to have been approximately 60 miles per hour the engine and the first five cars were derailed.

The engine stopped in a general tangential line, on its right side, about 35 feet south of the eastward main track, down an embankment and with the front end 423 feet east of the point of derailment. The right side of the engine was badly damaged, and the cab was demolished. The engine truck was torn loose from the engine, and stopped about 130 feet east of the engine. Breaks in the safety chains of the engine-truck assembly were new, which indicated that the chains broke as a result of the derailment. The tender remained coupled to the engine, and stopped on its right side at the rear of the engine and in line with it. The first car became separated from the tender and the second car, and stopped 28 feet east of the front end of the engine, down the embankment and at right angles to the tracks. Both trucks were detached. The second and third cars stopped between the engine and the eastward main track, down the embankment and at angles of about 30 degrees to the main tracks, with the front end of the second car 16 feet east of the engine. The fourth and fifth cars remained upright on the roadbed. The engine and the first three cars were badly damaged. The fourth and fifth cars were slightly damaged.

The weather was cloudy at the time of the accident, which occurred at 2:52:30 p. m.

The engineer was killed. The fireman, the conductor and the flagman were injured.

The total weight of engine 3727 in working order is 330,000 pounds, distributed as follows: Engine truck, 53,200 pounds; driving wheels, 209,300 pounds; and trailer truck, 57,500 pounds. The specified diameters of the engine-truck wheels, the driving wheels and the trailer-truck wheels are, respectively, 36, 30, and 50 inches. The rigid wheelbase of the engine is 13 feet 10 inches in length, the total length of the engine wheelbase is 33 feet 2 inches, and the total length of the engine and tender is 82 feet 11-3/4 inches. The tender is rectangular in shape and is equipped with two 4-wheel trucks. Its capacity is 43,600 pounds of coal and 11,300 gallons of water. The total weight of the tender loaded is 221,500 pounds. The center of gravity of the engine is 80 inches above the tops of the rails. The center of gravity of the tender, with the calculated amount of water and fuel at the time of the accident, is estimated as 76 inches above the tops of the rails. The engine is provided with No. 6-ET brake equipment. The last trip-inspection and repairs were completed at Harrisburg, Pa., 0.9 miles west of Royalton, about 11:30 a. m. on the day of the accident. The last class repairs were completed on June 19, 1945, and the last monthly certificate was issued on May 9, 1946. The accumulated mileage since the last class repairs was 79,354 miles.

Discussion

Passenger Extra 3727 East had just traversed a compound curve to the right, the maximum curvature of which was 2° , and was moving on a curve to the left, the specified curvature of which was 6° , when the engine and the first five cars were derailed. The engine overturned to the right and stopped 423 feet beyond the point of derailment. The maximum authorized speed for passenger trains in this territory was 40 miles per hour.

There was no defective condition of the engine prior to the accident. There was no indication of dragging equipment, or of any obstruction having been on the track. Examination of the engine after the accident disclosed that the automatic brake valve was in emergency position, the throttle lever was about one-half open, the independent brake valve was in application position and the reverse lever was in position for forward motion. There was no condition found that would prevent the proper application of the train brakes. The fireman said that when the train was approaching the curve to the right, located immediately west of the curve on which the derailment occurred, the engineer made a service brake-pipe reduction. The engine had been riding smoothly. When the engine entered the curve to the left the engineer closed the throttle and made another service brake-pipe reduction. The fireman was not certain whether the brakes were released between these brake-pipe reductions. The engine entered the curve to the left and lurched to the right before the brake-pipe exhaust of the second reduction had ceased, then the derailment occurred. The engineer was killed. The members of the train crew were in various locations throughout the cars of the train and they were not aware of anything being wrong until the accident occurred. The brakes of this train had been tested and had functioned properly en route. The fireman and the members of the train crew thought the highest speed attained between Royalton and the point of accident was about 40 miles per hour, and they estimated the speed at the time of the derailment as about 35 miles per hour. The investigation disclosed that this train passed Royalton at 2:47 p. m., stopped at a point 0.582 mile east of Royalton to make an adjustment to the ash-pan cleaning valve, then proceeded and had moved a distance of 2.782 miles eastward when the derailment occurred at 2:52:30 p. m. The time of derailment was automatically recorded at the time the power line was broken as a result of the accident. Based on the elapsed time of 5 minutes 30 seconds consumed by this train in proceeding from Royalton to the point of accident, a distance of 3.164 miles, and deducting a minimum time for stopping at least 10 seconds immediately east of Royalton, the average speed was about 43 miles per hour. In some of the territory between the point where the train stopped immediately east of Royalton and the point where the derailment occurred a speed considerably higher than 43 miles per hour was attained. The first mark of derailment was a flange mark on a tie 18 inches outside the high rail. There were no marks on the tops of the rails or between the rails. The engine was not equipped with a speedometer, but from the marks on the track and

the position of the derailed equipment after the accident it is apparent that the speed at the time of derailment was approximately the overturning speed for this curve. The maximum authorized speed throughout this territory is 40 miles per hour, which is the speed specified for passenger trains on both tangents and curves. The maximum safe speed on a 6°-curve having a superelevation of 4-1/2 inches, the specified curvature and the superelevation for the curve on which the accident occurred, is 50 miles per hour, and the overturning speed is 77 miles per hour. However, at the point where the derailment occurred the curvature was found to be 8° and the superelevation 2-1/8 inches. The division engineer said that under these conditions the maximum safe speed for engine 3727 at the point of derailment was 37.5 miles per hour and the overturning speed was 62.25 miles per hour. Therefore, the maximum authorized speed in this territory was 2.5 miles per hour in excess of the maximum safe speed for the actual curvature and superelevation existing on the curve when the derailment occurred. There were also irregularities in alinement, grade and cross-levels. According to the statement of the fireman, the brakes were applied when the train entered this curve. These factors combined with a speed somewhat less than the theoretical overturning speed would cause the engine to overturn.

The curve involved was last realigned about 3 months prior to the date of the accident. The track in this vicinity was inspected by a member of the track force about 9 a. m. on the day of the accident, and no unusual condition was observed at that time. However, after the accident measurements of the track on the curve disclosed that the curvature varied between 4° and 8°, that the gage varied between 4 feet 3-1/2 inches and 4 feet 9 inches, and that the superelevation varied between 2 inches and 4-1/2 inches.

Cause

It is found that this accident was caused by excessive speed on a curve on which the track was not properly maintained.

Dated at Washington, D. C., this twenty-ninth day of July, 1946.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.