

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 3205
READING COMPANY
REPORT IN RE ACCIDENT
AT EWING, N. J., ON
OCTOBER 1, 1948

SUMMARY

Railroad: Reading
Date: October 1, 1948
Location: Ewing, N. J.
Kind of accident: Derailment
Train involved: Passenger
Train number: 657
Engine number: 4066
Consist: Gas-electric rail motor-car 4066
Speed: In excess of 35 m. p. h.
Operation: Signal indications
Tracks: Double; tangent; 0.35 percent descending grade westward
Weather: Clear
Time: 11:42 a. m.
Casualties: 2 killed; 4 injured
Cause: Train entering turnout to siding at excessive rate of speed

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3205

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

READING COMPANY

December 22, 1948

Accident at Ewing, N. J., on October 1, 1948, caused by
a train entering a turnout to a siding at an
excessive rate of speed.

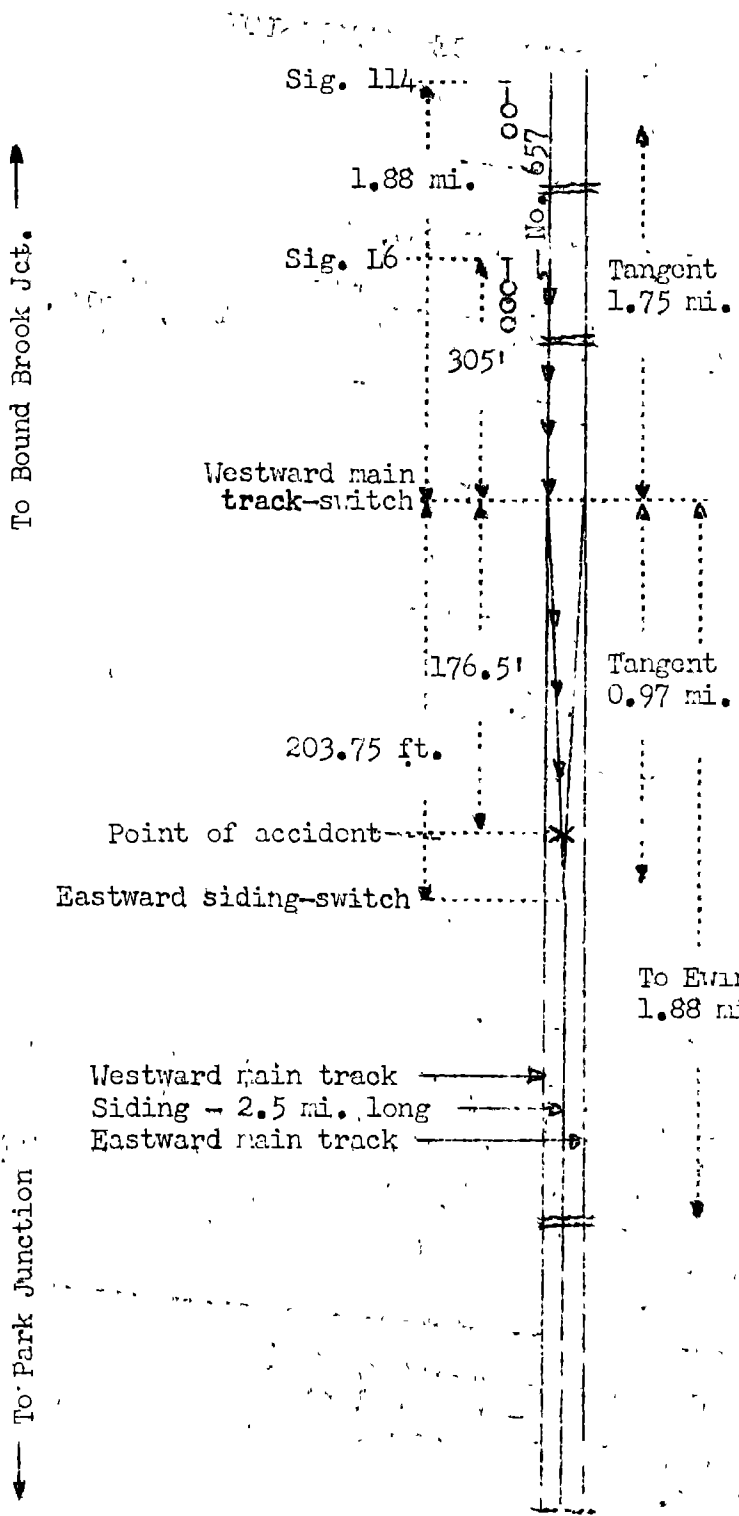
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On October 1, 1948, there was a derailment of a passenger train on the line of the Reading Company at Ewing, N. J., which resulted in the death of two passengers, and the injury of two passengers and two train-service employees. This accident was investigated in conjunction with representatives of the New Jersey Board of Public Utility Commissioners.

¹

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.



- Bound Brook Jct., N. J. 19.80 mi.
- "GH" Tower 0.70 mi.
- Pennington 2.22 mi.
- X Point of accident 1.88 mi.
- Ewing 1.30 mi.
- West Trenton, N. J. 31.40 mi.
- Park Junction, Pa. 1.70 mi.
- Philadelphia, Pa.

Inv. No. 3205
 Reading Company
 Ewing, N. J.
 October 1, 1948

Location of Accident and Method of Operation

This accident occurred on that part of the Philadelphia Division extending between Bound Brook Jct., N. J., and Park Junction, near Philadelphia, Pa., 57.3 miles. In the vicinity of the point of accident this is a double-track line, over which trains moving with the current of traffic are operated by signal indications. At Ewing, 24.6 miles west of Bound Brook Jct., a siding 2.5 miles long lies between the main tracks. Each end of this siding is connected to each main track. The westward main-track switch at the east end of the siding is located 1.88 miles east of the station at Ewing. The switches of the siding are controlled from an interlocking machine at West Trenton, 1.3 miles west of Ewing. The derailment occurred within interlocking limits on the siding turnout at the east end of the siding, at a point 176.5 feet west of the westward main-track switch. From the east on the westward main track there is a tangent 1.75 miles in length to the westward main-track switch at the east end of the siding and 0.97 mile westward. The grade is 0.35 percent descending westward.

The structure of the westward main track consists of 130-pound rails, 39 feet in length, laid new in 1937 on an average of 22 treated ties to the rail length. It is fully tieplated, spiked with 3 spikes per tieplate, and provided with 4-hole joint bars 24 inches in length, and 8 rail anchors per rail length. It is ballasted with crushed stone to a depth of 12 inches below the ties.

The westward main track turnout is constructed of 130-pound rail sections, and consists of a No. 10 rail-bound manganese frog and 20-foot switch points. The lead is 83 feet 10 inches in length. The siding turnout consists of a No. 6 frog and 15-foot switch points. The lead of this turnout is 58 feet 7 inches long. The track connecting the two turnouts is 42 feet 6 inches long. The total distance between the points of the westward main-track switch and the point of the siding switch is 203 feet 9 inches. Both frogs are protected by guard rails, and both switches are interlocked. The alinement from the westward main track to the siding is, successively, a 7°30' curve to the left 78 feet long, a tangent 74 feet, and an 11°30' curve to the right 51.75 feet. The distance between the center of the siding and the center of each main track is 13 feet.

Automatic signal 114 and interlocking home signal L6, governing west-bound movements on the westward main track, are, respectively, 1.88 miles and 305 feet east of the westward main-track switch. Signal 114 is of the two-unit, color-light type, and is approach lighted. Signal L6 is of the three-unit, color-light type, and is continuously lighted. The involved aspects, indications and names of these signals are as follows:

<u>Signal</u>	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
114	Yellow-over-Green	Proceed approaching next signal or block marker at medium speed.	Approach medium.
L6	Red-over-Yellow-over-Red	Proceed at medium speed preparing to stop at next signal.	Medium-approach.

The controlling circuits of these signals are so arranged that, when the route is lined for movement from the westward main track to the siding and the siding and the block between signals 114 and L6 are unoccupied, the operator at West Trenton can cause signal L6 to indicate proceed-at-medium-speed-preparing-to-stop-at-next-signal and signal 114 to indicate proceed-approaching-next-signal-at-medium-speed.

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

DEFINITIONS.

* * *

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

* * *

Medium Speed.--A speed not exceeding one-half authorized speed, but not exceeding 30 miles per hour.

* * *

The maximum authorized speed for the train involved was 70 miles per hour on the tangent track immediately east of the turnout, and 15 miles per hour on the turnout.

Description of Accident

No. 657, a west-bound first-class passenger train, consisted of gas-electric rail motor-car 4066, a 0-4-4-0 type. This train passed "GH" Tower, the last open office, 4.8 miles east of Ewing, at 11:34 a. m., on time, stopped at Pennington, 4.1 miles east of Ewing, passed signal 114, which indicated proceed-approaching-next-signal-at-medium-speed, passed signal 16, which indicated proceed-at-medium-speed-preparing-to-stop-at-next-signal, and while moving at a speed estimated to be in excess of 35 miles per hour it entered the turnout at the east end of the siding at Ewing and was derailed.

The motor-car overturned to the left on the eastward main track and slid on its left side to a point 612 feet west of the point of derailment. The rear truck was detached, but stopped near the rear of the car. The fuel tanks were damaged, escaping gasoline became ignited, and the roof, both sides and the interior fixtures were badly damaged by fire.

The engineer and the conductor were injured.

The weather was clear at the time of the accident, which occurred about 11:42 a. m.

The gas-electric rail motor-car was built in 1930 and was of conventional steel-plate, girder, post and sill construction. It was 75 feet 1/2-inch in length between coupler faces, weighed 163,300 pounds, and was divided into an engine compartment, a mail compartment, a baggage compartment and a passenger compartment, and had seating capacity for 30 passengers. The trucks were of the 4-wheel swing-motion type, and had a wheelbase of 7 feet 10-1/2 inches. The specified diameter of the wheels was 36 inches. The distance between truck centers was 53.5 feet. The traction motors were mounted upon the front truck. Fuel was supplied to the motors from two 250-gallon tanks attached to the floor midway between the trucks.

The car was powered by two 6-cylinder vertical-type continuous-duty motors, which drove the main generators. These motors were parallel to each other and were located one on each side of the engine compartment. Each engine

was provided with an exhaust system designed with a series of Y-shape fixtures attached to two cylinders each. These fixtures converged into elbows, which in turn were connected to a common manifold. These manifolds in turn were connected to exhaust pipes leading through the ceiling and roof to mufflers, thence to the atmosphere. The Y-shape fixtures had an inside diameter of 3 inches and wall thickness of 5/16-inch. The exhaust elbows and manifolds had an inside diameter of 3 inches and 1/4-inch wall thickness. The exhaust pipes had an inside diameter of 3 inches and wall thickness of 5/16-inch. The Y-fixtures were attached to the cylinders by bolted flange joints with metallic gaskets. The elbows fitted into the Y-fixtures with bolted expansion-sleeve joints. The entire exhaust arrangement was of circle-L No. 14 steel. Within the engine compartment, the exhaust systems were surrounded by metallic shrouding attached at the ceiling, open at top and bottom, and connected to the radiation chambers in the roof. Two 40-inch fans, rotating horizontally, exhausted fumes from the radiation chamber. Other ventilation means were register-type ventilators located in the centerline of the ceiling. One window was located on the left side of the engine compartment, one on each side of the front end, and three on the right side. When this type of car moved in forward motion it was controlled from a station located to the right and in front of the right motor.

The air-brake system was AML type and had brake valves at each end. It was provided with a safety-control feature actuated by release of pressure on either the brake-valve handle or on a foot-diaphragm pedal.

The last class repairs were completed on May 4, 1945. The last general inspection and repairs of the trucks were completed on August 12, 1948. The last trip inspection and repairs were completed at 7:15 p. m. on the day before the accident.

The center of gravity of the car was 56 inches above the plane of the tops of the rails. The calculated safe and overturning speeds of this car moving on a No. 10 turnout arc, respectively, 43 and 75 miles per hour, and on a No. 6 turnout, they are, respectively, 35 and 61 miles per hour.

Discussion

The investigation disclosed that prior to the accident Work Extra 1704 was occupying the westward main track west of signal L6. About 11:16 a. m. the train dispatcher instructed the operator at West Trenton to line the route for No. 657 to use the siding at Ewing to pass Work Extra 1704. About 11:42 a. m., No. 657 entered the westward main track turnout at the east end of the siding and was derailed on the siding turnout. The maximum authorized speed on this turnout was 15 miles per hour. Prior to the time of the accident gas-electric motor-car 4066 had been riding smoothly.

The first marks on the track structure were 171 feet 8 inches west of the westward main track switch. These marks consisted of three distinct gouges on the top surface of the south stock rail of the siding turnout to the eastward main track, and were 17-3/4 inches south of the south rail of the siding turnout to the westward main track. At a point 5 feet farther west a flange mark appeared on the top surface of the south switch rail of the siding switch and extended diagonally outward a distance of 4.5 feet to the point where it dropped from the rail. At a point 2 feet westward a heavy gouge mark appeared on the gage side of the south rail of the siding turnout to the eastward main track and extended 2 feet 7 inches westward to a point where a flange mounted this rail, crossed the head diagonally within a distance of 3 feet 1-1/2 inches, dropped to the outside, and scored the outer edge a distance of 4 feet 1-1/4 inches westward. A flange mark appeared on an adjustable brace 5-3/4 inches south of the south rail at the point of the siding switch, then flange marks appeared on the south ends of the ties of the siding a distance of 13 feet. Scraping marks outlined with paint from the car first appeared on the tops of the rails of the eastward main track 60 feet west of the siding switch.

Examination of the gas-electric car disclosed that the truck assemblies were in good condition, all wheels were tight on their axles, properly spaced, and the treads and flanges were within the carrier's prescribed limits. The foundation brake rigging was intact. The center castings, swing bolsters, side bearings and the spring assemblies were in good condition. The cut-out cock of the combined automatic and straight-air brake valve at the front end was cut in, and the one at the rear was cut out. The safety-control valve was in condition for use.

The theoretical safe and overturning speeds for gas-electric rail motor-car 4066 moving on a No. 10 turnout, are, respectively, 43 and 75 miles per hour, and moving on a No. 6 turnout are 35 and 61 miles per hour. Considering that this car safely negotiated the No. 10 turnout to the left, that the flanges crossed the tops of the rails while moving on a No. 6 turnout to the right, and that both the turnout and the car were in good condition, it is apparent that the speed was somewhat less than 60 miles per hour, but was considerably more than 35 miles per hour.

The crew of No. 657 consisted of the engineer, the conductor, and a baggageman. As No. 657 was approaching Ewing the engineer was alone in the control compartment at the front of the car, and the conductor and the baggageman were in the baggage compartment. The conductor estimated the speed as 45 miles per hour. The first any of these employees were aware of anything being wrong was when the car lurched hard to the right, then to the left, and overturned.

The engineer said that after No. 657 departed from Pennington he placed the transition lever in parallel position and placed the throttle in the third pulling position. Signal 114 indicated proceed-approaching-next-signal-at-medium-speed, and when No. 657 passed this signal the speed was about 35 miles per hour. The engineer understood from this indication that the route would be lined either to enter the siding at Ewing or to proceed westward on the westward main track. The engineer said that soon after his train passed signal 114 his consciousness became impaired by exhaust fumes from the engines to the extent that he was unable to see signal L6. He did not remember passing that signal, and he was not again fully conscious until after the derailment occurred. Just before losing consciousness he leaned forward and clung to the brake-valve handle. The brake of this car had been tested and had functioned properly at all points where used en route. No member of the crew felt any application of the brake prior to the accident. The engineer said that on previous trips on the same car he had suffered from headaches and faintness, but was able to revive by the admission of fresh air through the windows. Examination of the right engine of the car disclosed that the Y-fixture of the exhaust system attached to the Nos. 5 and 6 cylinders was broken into 5 pieces as a result of the derailment. There was evidence of a crack 3-1/2 inches long having existed in this fixture prior to the accident. The gaskets of the Y-fixture of the Nos. 3 and 4 cylinders of the left engine were leaking. There was a crack

in the V crotch of this fixture about 4-1/2 inches long, and the elbow fixture seated in the Y-fixture was partially collapsed as a result of thinning of the metal. These conditions would permit the escape of exhaust gases into the shrouding. Because of damage, the condition of the shrouding prior to the accident could not be determined. The No. 1 window on the right side at the engineer's location, the clear vision windows in the center door in front and the front section of the window on the left side were found open. Also, the left front window was open. The position of the control switches indicated that the circulating fans were running. Officials of the railroad said that under such conditions the air in the engine compartment should have been completely changed at intervals of 5.8 seconds. Daily inspection reports covering a 24-day period prior to the accident bore no notation concerning excessive exhaust fumes. However, the engineer involved said that he had frequently complained to the mechanical forces about excessive gases. The mechanical force at Trenton, N. J., inspected the engines at 7:15 p. m., September 30, and found no defective condition of the exhaust fittings. Examination after the accident indicated that leakage of exhaust gases had been present for a considerable period prior to the day of the accident. It is possible that on the day of the accident fumes escaped to the engine compartment instead of through the exhaust manifold shrouding and that the engineer absorbed carbon monoxide sufficient to impair his mental faculties temporarily.

Cause

It is found that this accident was caused by a train entering a turnout to a siding at an excessive rate of speed.

Dated at Washington, D. C., this twenty-second day of December, 1948.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.