

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

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INVESTIGATION NO. 5173  
THE BALTIMORE AND OHIO RAILROAD COMPANY  
REPORT IN RE ACCIDENT  
NEAR RASSELAS, PA., ON  
MARCH 20, 1942

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SUMMARY

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Railroad: Baltimore and Ohio  
Date: March 20, 1948  
Location: Rasselas, Pa.  
Kind of accident: Derailment  
Train involved: Freight  
Train number: Extra 7533 West  
Engine number: 7538  
Consist: 116 cars, cabooses  
Estimated speed: 20 m. p. h.  
Operation: Timetable, train orders and  
automatic block-signal system  
Tracks: Double; 8° curve; 0.96 percent  
descending grade westward  
Weather: Clear  
Time: 1:38 p. m.  
Casualties: 1 killed; 2 injured  
Cause: Broken rail

INTERSTATE COMMERCE COMMISSION

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INVESTIGATION NO. 3173

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

THE BALTIMORE AND OHIO RAILROAD COMPANY

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April 14, 1948

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Accident near Rasselas, Pa., on March 20, 1948, caused  
by a broken rail.

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REPORT OF THE COMMISSION<sup>1</sup>

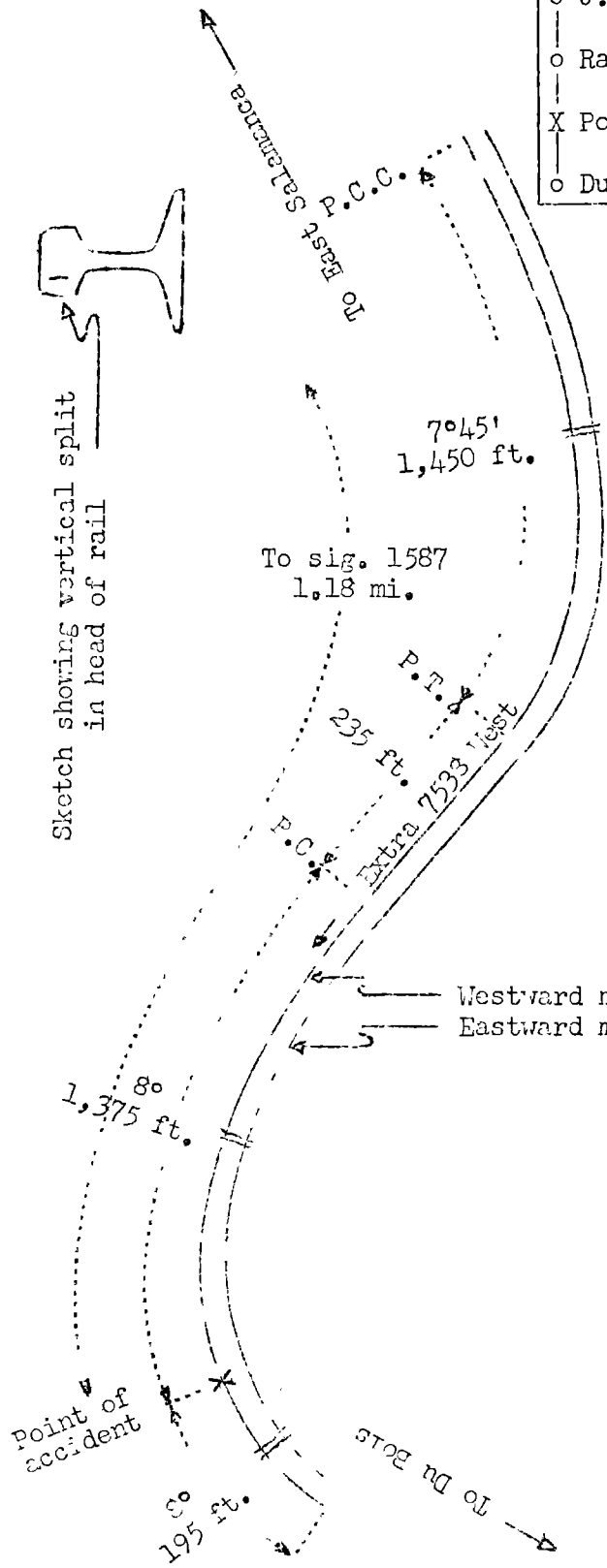
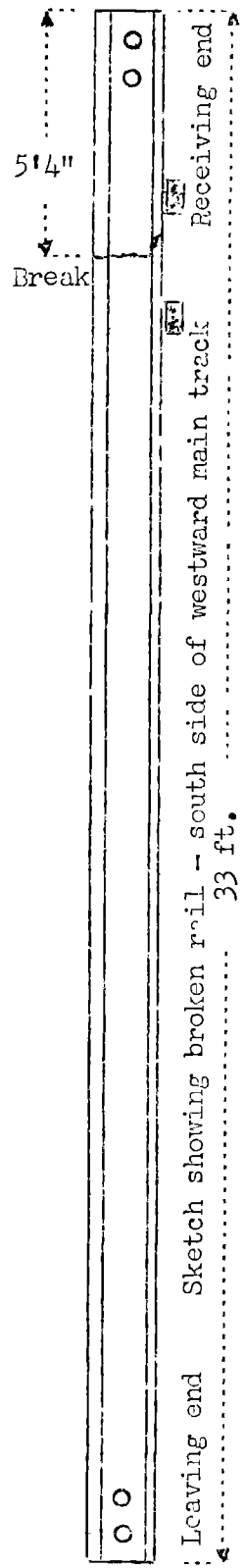
PATTERSON, Commissioner:

On March 20, 1948, there was a derailment of a freight train on the Baltimore and Ohio Railroad near Rasselas, Pa., which resulted in the death of one employee, and the injury of two employees.

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<sup>1</sup>  
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.

- o East Salamanca, N. Y. 39.60 mi.
- o J. & B. Junction, Pa. 11.40 mi.
- o Rasselas 1.57 mi.
- X Point of accident 44.23 mi.
- o Du Bois, Pa.



Inv. No. 3173  
 Baltimore and Ohio Railroad  
 Rasselas, Pa.  
 March 20, 1948

Location of Accident and Method of Operation

This accident occurred on that part of the Buffalo Division extending between East Salamanca, N. Y., and Du Bois, Pa., 96.8 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 timetable, train orders and an automatic block-signal system. The derailment occurred on the westward main track at a point 52.57 miles west of East Salamanca and 1.57 miles west of the station at Rasselas. From the east on the westward main track there are, in succession, a compound curve to the right, having a maximum curvature of  $7^{\circ}45'$ , 1,450 feet in length, a tangent 235 feet and an  $8^{\circ}$  curve to the left 1,375 feet to the point of accident and 195 feet westward. Throughout a distance of 7 miles immediately east of the point of accident the grade for west-bound trains varies between 0.07 and 1.09 percent descending to the point of accident, where it is 0.96 percent.

On the curve on which the accident occurred the track structure consists of 100-pound ASCE rail, 33 feet in length, laid on 18 treated hardwood ties to the rail length. It is fully tieplated, spiked with 2 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 cinders to a depth of 12 inches. The specified curvature was  $8^{\circ}$ , and the specified superelevation was 6 inches. At the point of accident the curvature was  $8^{\circ}20'$ , the gage was 4 feet  $8\text{-}3/4$  inches, and the superelevation was  $5\text{-}1/4$  inches.

Automatic signal 1587, governing west-bound movements on the westward main track, is 1.18 miles east of the point of accident.

In the vicinity of the point of accident the maximum authorized speed for the train involved was 30 miles per hour.

Description of Accident

Extra 7538 West, a west-bound freight train, consisting of engine 7538, a 2-6-6-2 type, 116 empty hopper-type cars and a caboose, passed J. & B. Junction, the last open office, 11.4 miles east of Rasselas, at 1:07 p. m., passed signal 1587, which displayed proceed, and while it was moving at an estimated speed of 20 miles per hour the engine, the tender and the first 20 cars were derailed.

The engine and the tender, remaining coupled, overturned to the right and stopped on their right sides, opposite the point of derailment, with the front end of the engine on the roadbed of the westward main track, and the rear end about 20 feet north of the centerline of the westward main track. The tender stopped about 25 feet north of the westward main track and at an angle of about 20 degrees to it. Of the first 20 cars, 3 stopped on top of the engine and the tender and the remainder stopped crosswise of both main tracks and practically at right angles to them, and were contained within a distance of 205 feet. The right side of the engine was badly damaged, and the cab was demolished as a result of its being telescoped by the tender. The centersill of the tender was broken just ahead of the front body bolster. Of the derailed cars, 5 were destroyed, and the remainder were considerably damaged. The twenty-first car was not derailed, but was off center.

The engineer was killed. The fireman and the front brakeman were injured.

The weather was clear at the time of the accident, which occurred about 1:38 p. m.

Engine 7538 is of the articulated compound Mallet type, and the total weight in working order is 437,000 pounds, distributed as follows: Engine truck, 25,000 pounds; driving wheels, 362,000 pounds; and trailer truck, 50,000 pounds. The specified diameters of the engine-truck wheels, the driving wheels, and the trailer-truck wheels are, respectively, 33, 57, and 43 inches. The driving wheelbase of the low-pressure engine and the high-pressure engine are each 10 feet 4 inches long. The total driving wheelbase is 31 feet 2 inches long, and the total wheelbase is 49 feet 10 inches long. The total length of the engine and tender is 96 feet 9-1/4 inches. The engine truck is provided with a swing-link constant resistance device. The low-pressure engine assembly is provided with 2 boiler-bearing sliding saddles, located 7 feet 5 inches and 12 feet 7 inches back of the centerline of the cylinders. The trailer truck is of the Delta type and is provided with side bearing cups. A spring-type buffer plate and casting assembly is arranged between the engine and the tender. No speedometer is provided.

The tender is rectangular in shape, and is equipped with two 4-wheel trucks. Its capacity is 12,000 gallons of water and 14 tons of coal. The weight of the tender loaded is 205,600 pounds.

The last class 4 repairs were completed on August 18, 1947. The last annual inspection and repairs were completed on March 9, 1948. The last trip inspection and repairs were completed at East Salamanca at 4:12 a. m., on the date of the accident. The accumulated mileage since the last class repairs was 19,547 miles.

The center of gravity of the engine is 76 inches above the tops of the rails. The center of gravity of the tender, with the calculated amount of fuel and water remaining at the time of the accident, was estimated as 57.7 inches above the tops of the rails. The calculated equilibrium, safe and overturning speeds for engine 7538 moving on an 8° curve having a superelevation of 6 inches are, respectively, 34, 47 and 70.8 miles per hour.

A rail found broken on the low side near the point of derailment was a 100-pound, ASCE section, manufactured by the Lackawanna Co. during April, 1922. The brand was 20485, letter C. This rail was relaid at the point of accident during 1937. The joint bars of the high rail were 100-pound, ASCE oversize toeless type, 24 inches in length, provided with 4 bolts 1-1/16 inches in diameter and 5-1/2 inches in length. They were applied in 1945. The joint-bar bolts were tightened by a power-driven bolt machine about three weeks prior to the day of the accident.

#### Discussion

Extra 7538 West was traversing an 8° curve to the left at an estimated speed of 20 miles per hour, in territory where the maximum authorized speed for this train was 30 miles per hour, when the engine, the tender and the first 20 cars were derailed at a point 1,375 feet west of the east end of the curve. Prior to the time of the accident, the engine and the cars were riding smoothly.

As Extra 7538 West was approaching the point where the derailment occurred the enginemen were maintaining a lookout ahead from their respective positions in the cab. The front brakeman was in the brakeman's booth on the tender, and the conductor and the flagman were in the caboose. Signal 1587, located 1.18 miles east of the point of accident, displayed proceed, and the enginemen called the indication. In compliance with the requirements of a train order restricting the speed of all trains to 20 miles per hour in the immediate vicinity of the station at Rasselas, the engineer made a brake application to reduce the speed, then released the brakes. When the

engine was about 1.25 miles east of the point of accident he again applied the brakes to control the speed. When the engine was about 4,000 feet east of the point of accident the latter application was released. The fireman said that when the engine was a short distance east of the point of accident the engineer descended from his seat to the deck. Soon afterward, the engine thrust hard to the left and downward, then thrust hard to the right and overturned. The engineer was killed. The first any member of the train crew was aware of anything being wrong was when the derailment occurred. The brakes of this train had been tested and had functioned properly en route.

When the engine was examined after the accident the throttle lever was in closed position and both brake valves were in running position. The engine-truck frame, the springs, swing links, bissell post, wheels, axles, radius bar and braces, journal boxes, and center castings were in good condition. The main equalizer was intact. The driving-box springs, spring saddles, spring hangers, equalizers, fulcrums and pins were in good condition, and there was no indication of fouling or of unequal distribution of weight. All wheels of the engine and tender were tight on their axles, and all tires were tight on their wheel-centers. Measurement of the wheels, tires and lateral motion were within the prescribed limits. The driving-box shoes and wedges, both boiler-bearing sliding saddles and plates, and the radial buffer were in good condition and well lubricated. The drawbar between the engine and tender was twisted about 3° at the tender end. The No. 2 axle of the front truck of the tender was bent as a result of its having been struck during the derailment. Both tender trucks were in place. The splash plates in the cistern were in place. There was no indication of improper wear or side-bearing clearance.

Examination of the track throughout a considerable distance east of the point of derailment disclosed no indication of dragging equipment, or of any obstruction having been on the track. The surface and alinement were well maintained for the maximum authorized speed. The first indication of disturbed track was at a point 299 feet east of the west end of the curve. At this point two successive rails on the north, or high, side had been moved northward progressively to a maximum distance of 8 feet from their normal locations. At a point 66 feet westward, a joint on the high side was separated, and three succeeding rails, remaining coupled, had been moved westward a distance of 12 feet, and they curved sharply to the north. The low rail was broken at a point 22 feet 4 inches



west of the point of separation of the high rail. This break occurred between ties at a point 5 feet 4 inches west of the receiving end. The break was angular through the head, square through the web and angular through the base. There was no mark on the flanges, the treads, or the side surfaces of the wheels of the engine to indicate that they had been in abnormal contact with the track structure.

Examination of the broken rail in question disclosed that it was worn on the top surface of the head about 1/4-inch, and the cross-sectional area had been reduced 7.8 percent. A vertical split 3/4-inch in length and 1/32-inch wide was present in the head at a point 7/8-inch inward from the gage side of the rail. In addition, a line of demarcation appeared between the cold-rolled metal and the remainder of the metal of the head at a point about 1/8-inch below the running surface of the head, and it extended transversely across the head. The separation of the high rail occurred as a result of the shearing of the Nos. 1 and 2 joint-bar bolts. The No. 2 bolt had not been recovered at the time the investigation was completed. The outer portion of the No. 1 bolt remained in place in the joint bar, together with the nut and lock washer. The central portion, which fitted through the web of the rail, was fractured outside the gage side of the web, and immediately inside the inner surface of the north joint-bar. The bend of the metal was toward the east, and the several portions of the bolt were reduced in diameter and elongated, which conditions indicated severe stress at the time of fracture.

The broken rail, the separated joint, and the fireman's statement that the engine lurched hard to the left and downward, then lurched hard to the right and overturned, indicate that the rail broke when one of the front wheels of the engine passed over it. Considering the curvature of the track, and the pressure exerted by the right engine-truck wheel and the right Nos. 1, 3, 4 and 6 driving wheels against the high rail, when the front of the engine lurched hard to the left, some portion of the high-pressure driving-wheel assembly momentarily exerted additional pressure against the high rail sufficient to cause a separation at the joint of the rail, and the engine and tender overturned, when the engine thrust to the right.

The track was last surfaced and lined during October, 1947, and was last inspected by the track force on the day before the accident occurred. The engine crew of a west-bound train,

moving on the westward main track, said that their train passed over the track involved about 3 hours 20 minutes prior to the accident, that their engine rode smoothly at normal speed, and that there was no indication of defective track. A rail-detector car was last operated over this territory on May 27, 1947, and no defective condition of the rail in question was indicated.

Cause

It is found that this accident was caused by a broken rail.

Dated at Washington, D. C., this fourteenth day of April, 1948.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,  
Secretary.