

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

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INVESTIGATION NO. 3229  
THE BALTIMORE AND OHIO RAILROAD COMPANY  
REPORT IN RE ACCIDENT  
AT SYKESVILLE, MD., ON  
JANUARY 22, 1949

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SUMMARY

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Railroad: Baltimore and Ohio  
Date: January 22, 1949  
Location: Sykesville, Md.  
Kind of accident: Derailment  
Train involved: Freight  
Train number: Extra 4466 East  
Engine number: 4466  
Consist: 74 cars, caboose  
Estimated speed: About 25 m. p. h.  
Operation: Signal indications  
Tracks: Double; 9°30' curve; 0.55 percent descending grade eastward  
Weather: Clear  
Time: 2:33 p. m.  
Casualties: 1 killed; 2 injured  
Cause: Overturning of a rail

INTERSTATE COMMERCE COMMISSION

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INVESTIGATION NO. 3229

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 5, 1949

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Accident at Sykesville, Md., on January 22, 1949, caused  
by the overturning of a rail.

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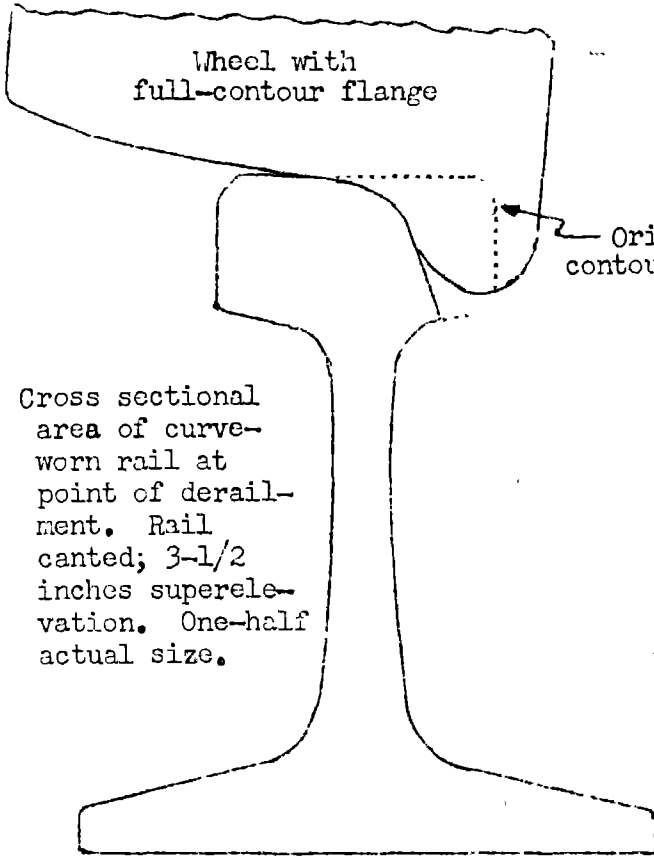
REPORT OF THE COMMISSION<sup>1</sup>

PATTERSON, Commissioner:

On January 22, 1949, there was a derailment of a freight train on the Baltimore and Ohio Railroad at Sykesville, Md., which resulted in the death of one train-service employee, and the injury of two train-service employees. This accident was investigated in conjunction with a representative of the Public Service Commission of Maryland.

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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.

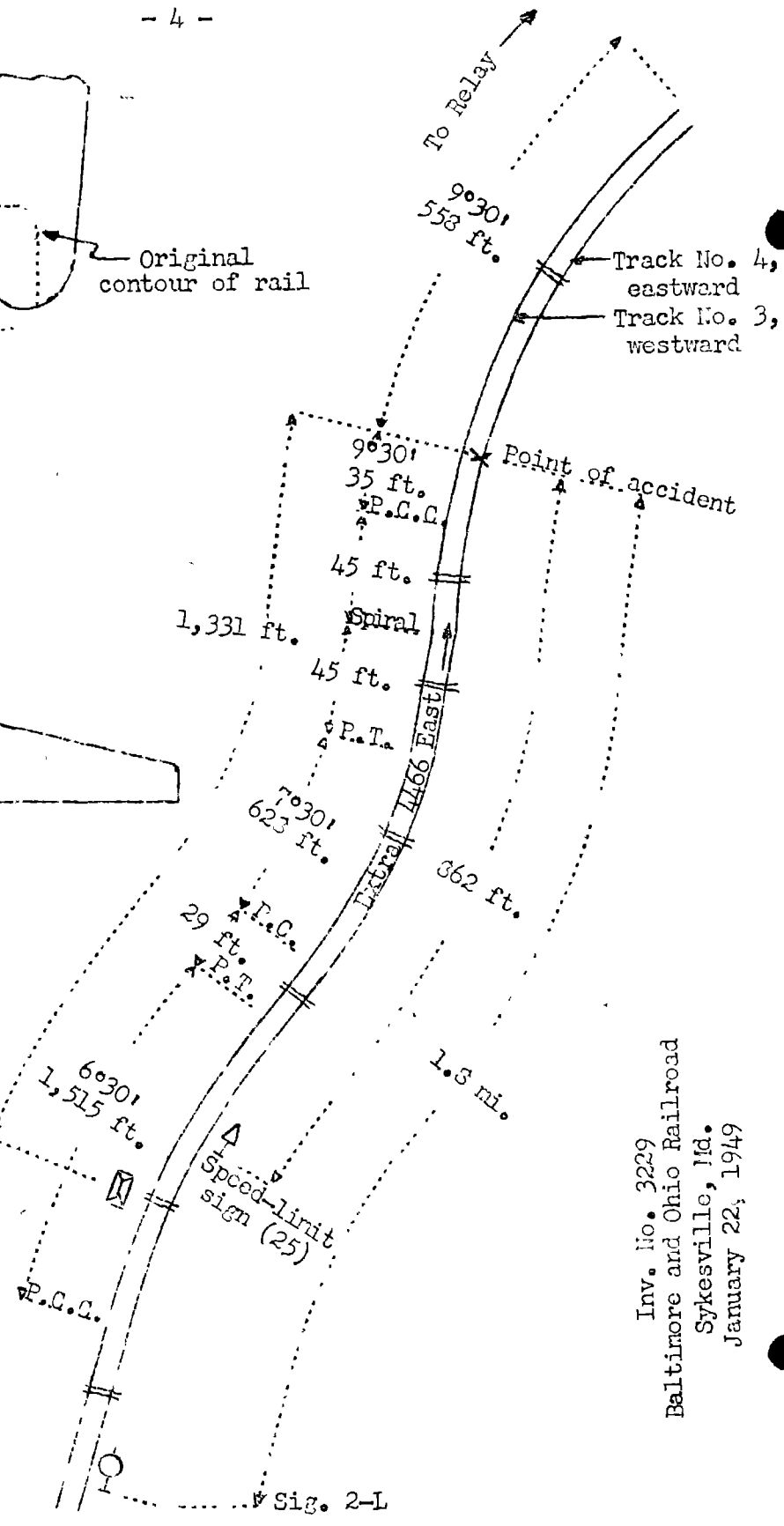


Cross sectional area of curve-worn rail at point of derailment. Rail canted; 3-1/2 inches superelevation. One-half actual size.

- o Relay, Md. 21.6 mi.
- X Sykesville (Point of accident) 1.3 mi.
- o Gaither 35.1 mi.
- o Point of Rocks, Md.

Sykesville

To Point of Rocks



Inv. No. 3229  
 Baltimore and Ohio Railroad  
 Sykesville, Md.  
 January 22, 1949

Location of Accident and Method of Operation

This accident occurred on that part of the Baltimore Division extending between Point of Rocks and Relay, Md., 58 miles, a double-track line, over which trains moving with the current of traffic are operated by signal indications. The main tracks from south to north are designated as No. 4, eastward, and No. 3, westward. The accident occurred on track No. 4 at a point 36.65 miles east of Point of Rocks and 1,331 feet east of the station at Sykesville. From the west on track No. 4 there are, in succession, a compound curve to the right, the maximum curvature of which is  $6^{\circ}30'$ , 1,515 feet, a tangent 29 feet, a  $7^{\circ}30'$  curve to the left 628 feet, a tangent 45 feet, a spiral to the right 45 feet, a compound curve to the right, the maximum curvature of which is  $9^{\circ}30'$ , 35 feet to the point of accident and 558 feet eastward. Between points 10.8 miles and 2,530 feet west of Sykesville, the grade for east-bound trains varies between 0.06 and 0.95 percent descending, then it is, successively, 0.70 percent descending 3,600 feet, and 0.55 percent descending 261 feet to the point of accident and about 1 mile eastward.

On the curve on which the accident occurred the structure of track No. 4 consists of 131-pound rail, 39 feet in length, laid new during March, 1947, on an average of 22 treated ties to the rail length. It is fully tieplated with double-shoulder canted tieplates, spiked with 2 rail-holding and 2 anchor spikes per tieplate, provided with 6-hole 36-inch joint bars fully bolted, and 8 rail anchors per rail length. It is ballasted with crushed stone to a depth of 12 inches below the ties. The specified superelevation on the curve was  $3\frac{1}{2}$  inches. A full section of 131-pound rail is  $7\frac{1}{8}$  inches high, and the head and base are, respectively, 3 inches and 6 inches wide.

Semi-automatic signal 2-L, governing east-bound movements on track No. 4 through the block in which the accident occurred, is located 1.8 miles west of the point of accident.

Timetable special instructions prescribe the maximum authorized speed for east-bound freight trains in the vicinity of the point of accident as 25 miles per hour. A permanent speed-restriction sign, triangular in shape, painted yellow and bearing the numerals 25 in black, is located 862 feet west of the point of accident.

### Description of Accident

Extra 4466 East, an east-bound freight train, consisted of engine 4466, a 2-8-2 type, 71 loaded and 3 empty cars and a caboose. This train passed signal 2-L, which indicated Clear, passed Gaither, the last open office, 1.3 miles west of Sykesville, at 2:29 p. m., passed the station at Sykesville, and while it was moving at an estimated speed of about 25 miles per hour the engine, the tender and the first twenty-five cars and the front truck of the twenty-sixth car were derailed.

The engine stopped between the main tracks and parallel to them, and leaned to the north at an angle of 30 degrees. The front end was 379 feet east of the point of derailment. The tender remained coupled to the engine, stopped at an angle of 45 degrees to the main tracks, and leaned to the north at an angle of 45 degrees. The left bottom guide-bar, the left main rod, and the left rear section of parallel rods were bent. The left guide-yoke end and the left No. 3 driving-wheel brake-head hanger were broken. Two connected rails, identified as having been laid in the south rail of track No. 3, pierced the throat sheets, passed through the firebox, broke an arch tube, and pierced both back-head sheets 7-1/2 inches above the firedoor ring. The first twenty-four cars stopped in various positions on either side of the main tracks or across them. The twenty-fifth and twenty-sixth cars stopped upright, on the roadbed of track No. 4 and in line with it. The fortieth and forty-seventh cars were not derailed but were badly buckled. The derailed cars were contained within a distance of 464 feet. The first to twenty-fourth cars, inclusive, were badly damaged.

The front brakeman was fatally injured, and the engineer and the fireman were injured.

The weather was clear at the time of the accident, which occurred about 2:33 p. m.

The total weight of engine 4466 in working order is 328,900 pounds, distributed as follows: Engine truck, 22,700 pounds; driving wheels, 248,000 pounds; and trailer truck, 58,200 pounds. The specified diameters of the engine-truck wheels, driving wheels, and trailer-truck wheels are, respectively, 33, 64 and 46 inches. The driving wheelbase is 16 feet 9 inches long, the total length of the engine wheelbase is 35 feet 1 inch, and the total length of the engine and its tender is 83 feet 9 inches. The spring-borne

weight of the engine is supported by an equalized spring system, which is divided into two parts. The front part includes the engine truck and the Nos. 1 and 2 pairs of driving wheels, and the rear part includes the Nos. 3 and 4 pairs of driving wheels and the trailer truck. The engine truck is provided with a swing-link constant-resistance device and a centerpost, and the trailer truck is equipped with friction-type side bearings at the rear of each wheel. A radial buffer assembly with floating block and two helical springs back of the tender chafing plate is arranged between the engine and the tender. The engine is not equipped with a speedometer.

The tender has a rectangular-shape coal bunker and a cylindrical cistern. Its capacity is 20 tons of coal and 12,000 gallons of water. It has two 4-wheel trucks, and is provided with non-swing bolsters having integral center plates, and friction side-bearings of the block type mounted in pockets. The body bolsters are provided with side-bearing plates. The weight of the tender loaded is 219,000 pounds. It is 34 feet 1 inch long.

The last class 3 repairs of engine 4463 were completed on January 18, 1949. The last trip inspection and repairs were completed at Brunswick, Md., 43.3 miles west of Sykesville, during the morning of January 22, 1949. The accumulated mileage since the last class 3 repairs was 398 miles.

The center of gravity of engine 4466 is 70.7 inches above the tops of the rails. The theoretical equilibrium, safe and overturning speeds of this engine moving on a 9°30' curve having a superelevation of 3-1/2 inches are, respectively, 23.6, 42.2 and 66.8 miles per hour.

#### Discussion

As Extra 4466 East was approaching Sykesville, the enginemen and the front brakeman were in the cab of the engine and the conductor and the flagman were in the caboose. Signal 2-L, governing east-bound movements through the block in which the accident occurred, indicated Clear, and the members of the crew on the engine called the indication. The engineer said that when the engine was about 2,600 feet west of the point where the accident occurred the speed was about 25 miles per hour, and that the train was drifting. At that time he made a 6-pound brake-pipe reduction and released the engine-and-tender brake, but he did not release the train brakes.

He thought that brake-pipe leakage further increased the brake-pipe reduction to a total of 10 pounds, and that the speed was reduced to about 12 miles per hour when the accident occurred. He said that the first indication of derailment was when he felt the front end of the engine drop. Prior to this time the engine had been moving smoothly, there was no lurching or rolling, and there was no indication of anything binding or fouling on either the engine or the tender. The engineer said that the engine was somewhat rigid as it rounded curves, but rigidity is a common characteristic of an engine just out of class 3 repairs. The conductor estimated the speed as 25 miles per hour at the time of the accident. He thought the train brakes were not applied until separations occurred between the derailed cars, because he heard the brake on the caboose become applied at that time. The flagman estimated the speed as 18 miles per hour. The section foreman in charge of the track in this vicinity was standing about 20 feet south of track No. 4 at a point 296 feet west of the point where the derailment occurred. He estimated the speed as 35 miles per hour when the engine passed him, and he said there was no indication of rough movement of the engine, or of dragging equipment on the engine, tender or any car that passed him. The fireman was so badly injured that he could not be questioned.

Examination of engine 4466 after the accident disclosed that the throttle was closed, the reverse lever was in position for full cut-off in forward motion, and both brake valves were in running position. Except for a loosened transverse brace, which was a result of the derailment, the engine truck and its related parts were in good condition and moved freely. The driving-wheel assembly and the trailer-truck assembly were in good condition. The flanges and the treads of all wheels of the engine and tender were of full contour, and there was no trace of wear. All wheels were tight on their axles and were parallel to their companion wheels, and all tires were tight on their wheel centers. The lateral motion of all pairs of wheels of the engine was in accordance with minimum requirements of the carrier. The driving-box shoes and wedges moved freely. The spring arrangements were maintained in good alignment and were level, and there was no indication of fouling or any unequal distribution of weight. The trailer-truck friction bearings and the radial assembly were well lubricated and conformed to the requirements. Both trucks of the tender were torn loose and were considerably damaged during the derailment, but there was no indication of a defective condition prior to the derailment, and there was no indication of improper side-bearing clearance. The splash plates were secured in place. The broken parts on the



left side of the engine were found in the ballast adjacent to the engine, and apparently were torn off by rails from track No. 3. These rails scored a straight line across the counterbalance of the left No. 3 driving wheel before they pierced the throat sheet. Except for ballast marking, there was no other mark on the flanges, treads or side surfaces of the wheels of the engine or the tender to indicate abnormal contact with the track structure.

Examination of track No. 4 throughout a distance of 676 feet west of the curve on which the accident occurred disclosed that the surface, gage and alinement were maintained adequately for the maximum authorized speed. Between points 438 feet and 177 feet west of the point of accident, tops of rail anchors, joint bars and joint-bar bolts inside the north rail were marked. These marks progressively increased in severity to a point 180 feet west of the point of accident, where all the bolts of a rail joint were broken. This rail remained in place at its receiving end, but it was canted outward at its leaving end, at which point the inside spikes were pulled about 3 inches. There were dragging marks on the inside surface of the web of this rail. All the marks west of the joint where the bolts were broken were identified as having been caused by a pocket of a buckled hopper-type car in the train having been in contact with the web of the rail, the rail anchors and the joint bars. Starting at a point 151 feet west of the point of accident, both tracks were destroyed throughout a distance of 429 feet eastward.

The derailment occurred near a joint between two rails on the north side of track No. 4. Of these rails, portions 13 feet 4 inches west of the joint and 25 feet 8 inches east of the joint were not recovered. The receiving portion of the rail west of the joint was broken into 2 pieces, one of which was 5 feet 7 inches long, and the other was 20 feet 1 inch long. The two recovered pieces of the east rail were gouged in the web and on the lower inside edge of the head and these marks extended throughout the entire length of both pieces. The inside joint bar and bolts at the receiving end were heavily battered. Both breaks were ragged and irregular in contour and the structure of the metal was sound. Apparently, the breaks occurred after the rail was overturned. The location of this rail in the track included a portion of the spiral and extended into the full curvature of  $9^{\circ}30'$ . At the east end of the second piece of rail, the gage side of the head was worn  $5/8$  inch at the lower edge and the curve-wear line sloped

diagonally upward and outward at an angle of 19 degrees a distance of 1-1/4 inches, then it rounded outward to a point on the original top surface 2-1/16 inches from the original gage side of the rail. Approximately 34 percent of the cross-sectional area of the head of the rail was worn away. Examination of all the recovered rails disclosed no mark which indicated that a wheel had crossed over the top surface of any of the rails.

The rails of track No. 4 were a part of 20,000 tons of rails received by this carrier during 1946. Of these rails, only six had failed prior to this accident, but none of these rails was from the same heat number as the rail under investigation. The track on the curve on which the accident occurred was last gaged by the section foreman about 3-1/2 hours before the accident occurred, and at that time it was in good condition. The crew of an east-bound freight train which passed over the track in question about 20 minutes prior to the time of the accident said that the engine and the cars rode smoothly at a speed of 20 miles per hour and that there was no indication of defective track. The track was last surfaced on October 21, 1948, and it was last inspected by the track supervisor on January 19, 1949. A rail detector car was last operated over this territory on September 3, 1948, and no defective condition of the rail in question was indicated at that time.

The investigation of this accident disclosed no defective condition of the equipment of the train, and there was no indication of any obstruction having been on the track. The only indication of dragging equipment was identified as having been caused after the derailment occurred. The only mark on the flanges, treads or side surfaces of any wheel of the engine or of the tender was also identified as having been caused after the derailment occurred. There was no flange mark on the top surface of any of the recovered rails. The engine had an accumulated mileage of only 398 miles after having received class 3 repairs. The highest estimate of the speed of the train at the time of the accident was 11.4 miles per hour higher than the equilibrium speed on the curve in question. Considering that the speed was higher than equilibrium speed, that the engine was somewhat rigid, that the flanges of the wheels of the engine were of full contour, and that the high rail of the curve was considerably curve-worn, it is apparent that the flanges were in contact with the upper part of the inclined surface of the curve-worn area of the head of the rail. As a result, the forces were directed sufficiently outward and downward to cause the rail to overturn.

Cause

It is found that this accident was caused by the overturning of a rail.

Dated at Washington, D. C., this fifth day of April, 1949.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,  
Secretary.