

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

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INVESTIGATION NO. 3039  
THE NEW YORK CENTRAL RAILROAD COMPANY  
REPORT IN RE ACCIDENT  
AT REX, IND., ON  
NOVEMBER 22, 1946

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SUMMARY

Railroad:	New York Central
Date:	November 22, 1946
Location:	Rex, Ind.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	Second 415
Engine number:	5381
Consist:	10 cars
Estimated speed:	60 m. p. h.
Operation:	Signal indications
Track:	Single; tangent; 0.09 percent descending grade westward
Weather:	Clear
Time:	11:53 a. m.
Casualties:	1 killed; 18 injured
Cause:	Broken guide-yoke-end

INTERSTATE COMMERCE COMMISSION

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INVESTIGATION NO. 3039

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

THE NEW YORK CENTRAL RAILROAD COMPANY

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January 14, 1947

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Accident at Rex, Ind., on November 22, 1946, caused by a  
broken guide-yoke-end.

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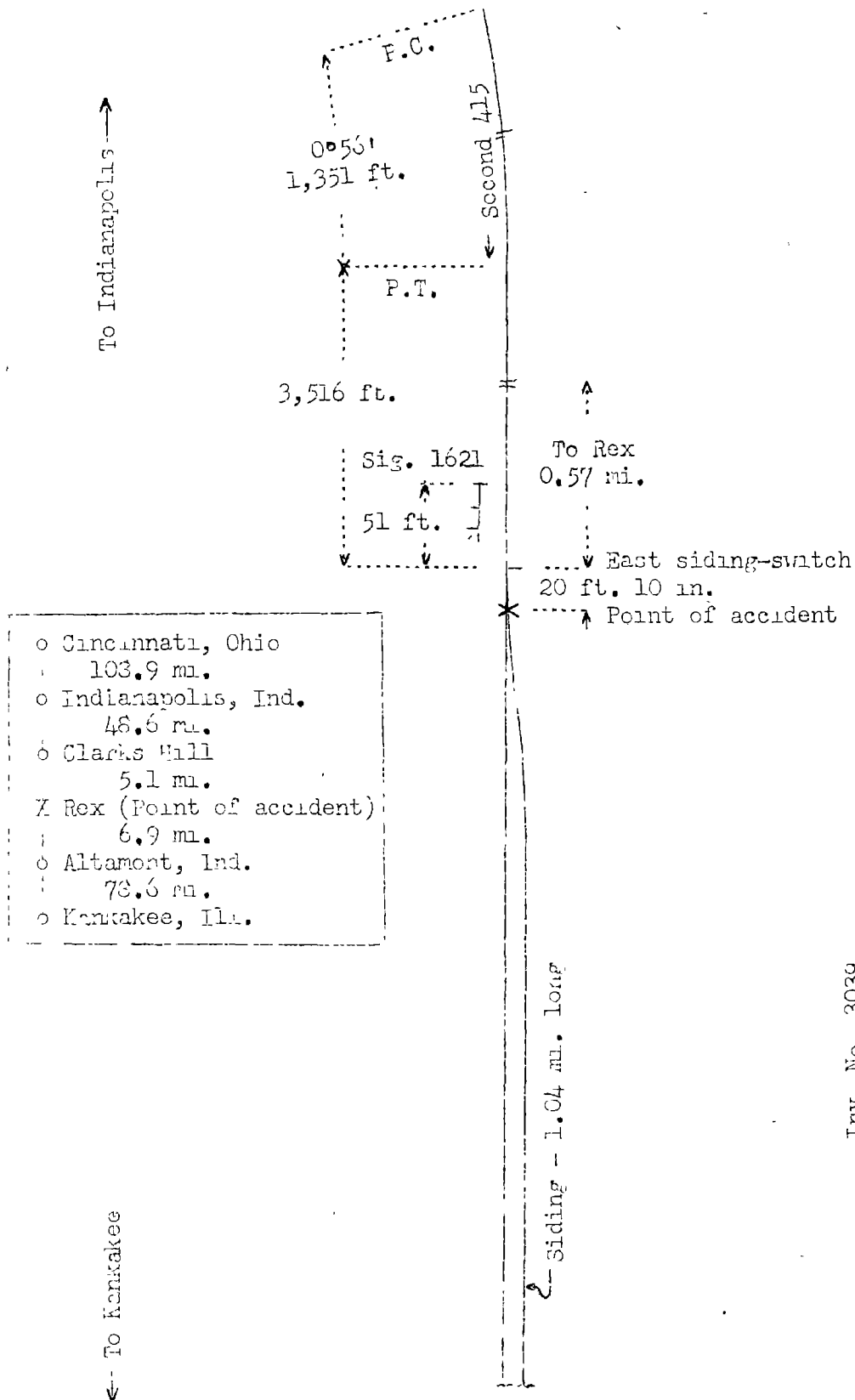
REPORT OF THE COMMISSION<sup>1</sup>

PATTERSON, Commissioner

On November 22, 1946, there was a derailment of a passenger train on the New York Central Railroad at Rex, Ind., which resulted in the death of one train-service employee, and the injury of eight passengers, three Pullman employees, six dining-car employees and one train-service employee. This accident was investigated in conjunction with a representative of the Indiana Public Service Commission.

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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.



Inv. No. 3039  
New York Central Railroad  
Rex, Ind.  
November 22, 1946

Location of Accident and Method of Operation

This accident occurred on that part of the Indiana Division extending between Indianapolis, Ind., and Kankakee, Ill., 139.2 miles, a single-track line in the vicinity of the point of accident, over which trains are operated by signal indications. At Rex, 53.7 miles west of Indianapolis, a siding 1.04 miles in length parallels the main track on the south. The east switch of this siding is 0.57 mile west of the station. The derailment occurred on the main track at a point 20 feet 10 inches west of the east siding-switch. From the east there is a  $0^{\circ}56'$  curve to the right 1,351 feet in length, which is followed by a tangent 3,516 feet to the east siding-switch and a considerable distance westward. The grade for west-bound trains is 0.09 percent descending.

The turnout of the east siding-switch consists of 127-pound switch points, 127-pound rails and a No. 10 spring type frog laid on 66 switch ties. It is fully tieplated and double-spiked, and is ballasted with crushed stone to a depth of 12 inches. The curvature of the turnout is  $7^{\circ}25'10''$ . The switchstand is of the hand-throw intermediate-stand type, and is located 6 feet  $7\frac{3}{8}$  inches north of the north rail of the main track. When the switch is lined normally a green target is displayed at right angles to the track. When the switch is lined for entry to the siding a red target is displayed at right angles to the track. The operating lever is of the horizontal-throw type, and is provided with holes for the insertion of keeper pins to secure the lever in the desired position. The keeper pins are provided with holes at the lower end for the insertion of switch-lock shackles. The switch points are arranged for a throw of  $4\frac{3}{4}$  inches, and the points are maintained in proper relation by two switch rods. A connecting rod 6 feet 8 inches long and  $1\frac{1}{2}$  inches thick connects the crank of the switchstand and the switch points, and is located between the head-block ties.

Automatic signal 1621, governing west-bound movements, is 51 feet east of the east siding-switch at Rex. The controlling circuits are so arranged that, when the block immediately west of signal 1621 is unoccupied and the east siding-switch is lined for movement on the main track, this signal displays proceed. When the switch is lined for entry to the siding, the signal displays stop.

The maximum authorized speed for the train involved was 80 miles per hour.

### Description of Accident

Second 415, a west-bound first-class passenger train, consisted of engine 5381, one express car, one passenger-baggage car, two coaches, one dining car and five Pullman sleeping cars, in the order named. All cars were of steel construction. This train passed Clark's Hill, the last open office, 5.1 miles east of Rex, at 11:49 a. m., 36 minutes late, passed signal 1621, which displayed proceed, and while moving at an estimated speed of 60 miles per hour the engine and the first five cars were derailed.

The engine and tender, remaining coupled, stopped on their left sides on the siding and in line with it, with the front end of the engine 480 feet west of the east siding-switch. The left side of the cab was crushed inward against the firebox, and the reciprocating assembly on the right side of the engine was bent and broken. The first and second cars stopped on the siding at the rear of the tender and in line with it, and leaned to the south at angles of about 45 degrees. The third car stopped upright at the rear of the second car, across the siding and the main track and at an angle of 45 degrees to them. The fourth car stopped at the rear of the third car, practically upright, across the main track and at an angle of about 45 degrees to it. The fifth car stopped upright on the turnout of the siding with its rear end 45 feet west of the switch. The first to fourth cars, inclusive, were considerably damaged, and the fifth car was slightly damaged.

The weather was clear at the time of the accident, which occurred about 11:53 a. m.

The fireman was killed, and the engineer was injured.

Engine 5381 is of the 4-6-4 type, and its operating steam pressure is 225 pounds. The steam distribution is controlled by valve gear of Baker-Pilliod design. The valve events are actuated by a combination lever attached to the crosshead by a union link, and by an eccentric rod connected to the eccentric crank located on the main driving-wheel crank pin. The main rods connect the crossheads and the No. 2 pair of driving wheels. The piston rods are 4-3/4 inches in diameter, seated in the boss of the crosshead to a depth of 8-3/8 inches, and secured by crosshead keys of forged steel, 1-1/8 inches thick and 12-5/8 inches long, and tapered at a ratio of 1/2-inch in 12 inches to a width of 4-1/16 inches at the lower end. The keys are driven downward at an angle

of 45 degrees through slots in both the crosshead boss and the piston rod,, and are secured at the lower end by cotter pins 3/8-inch thick. The crossheads are of the three-piece alligator-type, and move between the inner surfaces of two guide bars. The top and the bottom guide bars on each side are attached at the front end to the cylinder castings by two fitted bolts 1-3/8 inches in diameter, and at the rear end to the guide-yoke-end by three fitted bolts 1-1/2 inches in diameter. The guide yoke consists of a cast-steel member located transversely on the top rails of the main frame and in front of the No. 1 pair of driving wheels. Guide-yoke-ends are attached to each end of the guide yoke. The guide-yoke-ends are of the hanger type, consisting of a bracket plate at the top, and a curved member 45-1/8 inches long. The greater portion of the curved member is of channel-section. Projecting ledges, 20-1/2 inches long, 1-3/4 inches thick and spaced 28 inches apart, are provided to support the guide bars. The portion of the guide-yoke-end between the guide-bar supports is 11-3/8 inches wide and varies between 1-1/8 inches and 2 inches in thickness.

The last Class 3 repairs of engine 5381 were completed on June 19, 1946, the last quarterly inspection and repairs were completed on September 18, 1946, the last monthly inspection and repairs were completed on November 15, 1946, and the last trip inspection and repairs were completed at Cincinnati, Ohio, 162.6 miles east of the point of accident, at 5:45 a. m. on the day of the accident. The accumulated mileage since the last class repairs was 52,000 miles.

#### Discussion

Second 415 was moving on tangent track at a speed of about 60 miles per hour, in territory where the maximum authorized speed was 80 miles per hour, when the engine and the first five cars were derailed.

As Second 415 was approaching Rex the speed was 80 miles per hour, as indicated by the tape of the speed-recorder with which the engine was equipped, the throttle was open and the reverse gear was in position for about 35 percent cutoff in forward motion. The enginemen were maintaining a lookout ahead. The engine was riding smoothly, and there was no condition about the engine that obscured the vision. Signal 1621 displayed proceed and the engineer observed that the east ~~siding-switch~~ was lined for movement on the main track. When the engine was about 2,500 feet east of the switch the engineer observed that ballast was flying from the track near the front end of the engine. He immediately moved the brake valve to emergency position and

closed the throttle, but the derailment occurred before the train could be stopped. The brakes of this train had been tested and had functioned properly en route. The fireman was killed in the accident. The members of the train crew were not aware of anything being wrong until the brakes were applied in emergency.

After the accident, examination of the east siding-switch disclosed that the operating lever was locked in position for the switch points to be lined for movement on the main track. The north switch-point was open 1 inch and the south point was open 3-3/4 inches. The switchstand was broken. The connecting rod between the switchstand and the switch points was bent downward at a point 2.5 feet north of the north switch point, and bent westward at a point 1.5 feet north of the north switch point. The first mark of derailment was a flange mark on the ties inside the south switch-rail at a point 20 feet 10 inches west of the switch. At a point 3 feet westward there was a flange mark on the ties inside the north rail of the main track. From this point westward to the point where the engine overturned the track was torn up.

Examination of the engine disclosed that, in addition to the damage sustained on the left side of the engine as a result of the derailment, the right guide-yoke-end was broken immediately above the bottom guide, the bottom guide and the piston-rod crosshead key were missing and the piston was shoved forward in the cylinder. The right valve-stem was broken. The right main rod was bent inward at the front end and remained connected to the crosshead, which in turn remained attached to the union link and the combination lever. There was no mark on either engine-truck wheel that indicated these wheels had been in contact with the ballast prior to the overturning of the engine. The flanges of the tires of the No. 1 pair of driving wheels and the left No. 2 driving wheel were badly scored. This condition indicates that these wheels had been in contact with the sides of rails and angle bars prior to the overturning. Examination of the track throughout a considerable distance immediately east of the switch disclosed that it was well maintained for normal service. At a point 3,100 feet east of the east siding-switch there was a gouging mark in the ballast 12 inches north of the north end of a tie. The front bolts of the right bottom guide-bar of the engine were found near this location. These bolts were sheared squarely and the fractures were new. The bottom guide-bar and the lower portion of the guide-yoke-end were found north of the track at a point 500 feet westward. The piston-rod key and a crosshead shoe were found at a point about 1,000 feet west of the first mark in the ballast. From this point westward to the east siding-switch scooping marks appeared in the ballast at the ends of



ties and on the north ends of ties at intervals of about 40 feet. The marks on the track structure and the numerous pieces of material from the engine distributed throughout this distance indicate that the right guide-yoke-end failed, then the lower guide-bar was torn loose, the piston-rod became disconnected and the front end of the right main rod was suspended by the combination lever and union link. The front end of the main rod then struck the ballast and the ends of ties as the main pin moved from top quarter to front center and continued to strike the track structure at intervals until it encountered the connecting rod of the east switch. At this instant the engine-truck wheels had already passed the switch points. After the main rod damaged the connecting rod of the east switch, the switch points were opened sufficiently to permit the right driving wheels to move on the north running rail and the left driving wheels to move on the south stock rail of the switch until the gage became sufficiently wide for these wheels to drop on the ties.

Examination of the guide-yoke-end involved disclosed that it had broken in an irregular line throughout its width and both side walls at points varying between 2-3/4 inches and 3-1/8 inches above the bottom guide-bar support. This break extended inward through the sidewalls of the channel-section. These sides are practically circular in shape, 2 inches in diameter, and are connected to the back surface by necks about 1-1/8 inches thick. The front side wall projects 3-7/8 inches and the back sidewall, 4-5/8 inches. The break through the front side wall was an old progressive detail fracture covering about 35 percent of the area involved. About 15 percent of this part of the fracture had previously been welded. About 30 percent of the break was a comparatively recent progressive fracture, and the remainder of the break was new. The records of the carrier disclosed that the welding involved had been performed September 18, 1946, and had covered an area about 2-1/2 inches by 6 inches. The area of weld included in the break was 2-1/4 inches by 3-1/16 inches. The remainder of the break was through parent metal. On October 19, 1946, the guide-yoke-end was covered with crack-detector whitening and vibrated. At that time there was no indication that any fracture had reached the surface. Since the bottom guide-bar was 4-23/32 inches thick at the location of the fracture and was mounted on a liner 5/8 inch thick, the break was in such position that it was concealed from detection by ordinary inspection. On the day of the accident, this engine was dispatched from Cincinnati, Ohio, 162.6 miles east of Rex. The engineer who was operating Second 415 at the time of the accident took charge of the engine at Indianapolis about 10:30 a. m. on the day of the accident. He applied oil to the guides

and made a visual inspection of various parts of the engine at that point, and he did not find any indication of defective condition of the guide-yoke-end.

Cause

It is found that this accident was caused by a broken guide-yoke-end.

Dated at Washington, D. C. this fourteenth day of January, 1947.

By the Commission, Commissioner Patterson

(SEAL)

W. P. BARTEL,

Secretary.