RAILROAD ACCIDENT INVESTIGATION

Report No 3841

THE PENNSYLVANIA RAILROAD COMPANY

MACE, OHIO

APRIL 13, 1959

INTERSTATE COMMERCE COMMISSION

Washington

SUMMARY

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DATE	April 13, 1959
RAILROAD	Pennsylvania
LOCATION	Mace, Ohio
KIND OF ACCIDENT	Derailment
TRAIN INVOLVED	Passenger
TRAIN NUMBER	54
LOCOMOTIVE NUMBER	Diesel-electric units 5704A, 5801A, and 5806A
CONSIST	13 cars
SPEED	43 m p h
OPERATION	Signal indications
TRACKS	Double, tangent, level
WEATHER	Clear
TIME	6 26 a m
CASUALTIES	7 injured
CAUSE	Broken journal due to overheating

INTERSTATE COMMERCE COMMISSION

REPORT NO 3841

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

THE PENNSYLVANIA RAILROAD COMPANY

August 6, 1959

Accident at Mace, Ohio, April 13, 1959, caused by a broken journal due to overheating

REPORT OF THE COMMISSION[1]

FREAS, Commissioner

On April 13, 1959, at Mace, Ohio, there was a derailment of a passenger train on the Pennsylvania Railroad, which resulted in the injury of 5 passengers and 2 dining-car employees

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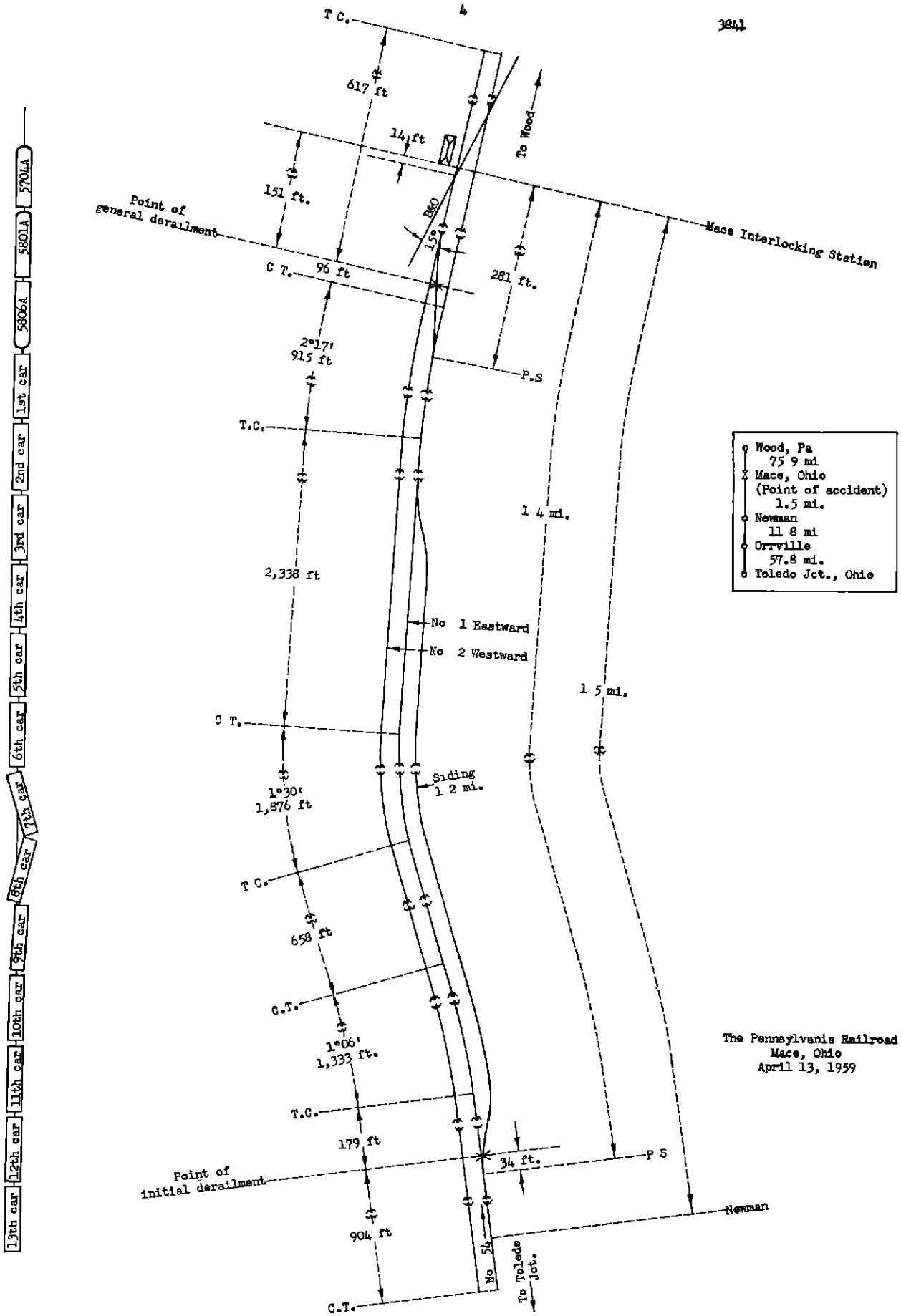
[1]Under authority of section 17 (2) of the *Interstate Commerce Act* the above-entitled proceeding was referred by the Commission to Commissioner Freas for consideration and disposition



13th car | 12th car | 11th car | 10th car | 9th car | 8th car | 7th car | 6th car | 5th car | 4th car | 3rd car | 2nd car | 1st car | 5806A | 5801A | 5704A

Location of Accident and Method of Operation

This accident occurred on that part of the Lake Region extending between Toledo Jct , Ohio, and Wood, Pa , 147 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 Trains moving against the current of traffic are operated by train orders and a manual block-signal system From south to north the main tracks are designated as No 1, eastward, and No 2, westward Mace, Ohio, is located 71 1 miles east of Toledo Jct Within interlocking limits at Mace a single-track line of the Baltimore and Ohio Railroad crosses the main tracks at an angle of approximately 15 degrees The center of this crossing on track No 2 is located 14 feet west of the interlocking station A crossover connects the main tracks at Mace The west switch of this crossover is facing-point for eastbound movements on track No 1 and is located 281 feet west of the interlocking station At Newman, 1 5 miles west of Mace, a siding 1 2 miles in length parallels track No 1 on the south The west switch of this siding is 1 4 miles west of Mace

The initial derailment occurred on track No 1 at a point 34 feet east of the west switch of the siding at Newman, and the general derailment occurred at the crossover at Mace at a point 151 feet west of the interlocking station From the west on track No 1 there are, in succession, a tangent 904 feet in length to the point of initial derailment and 179 feet eastward, a 1°06′ curve to the left 1,333 feet, a tangent 658 feet, a 1°30′ curve to the right 1,876 feet, a tangent 2,338 feet, a 2°17′ curve to the right 915 feet, and a tangent 96 feet to the point of general derailment and 617 feet eastward The grade is level at the point of initial derailment and is 0 38 percent descending eastward at the point of general derailment

In the vicinity of the point of accident the main track structure consists of 152-pound and 155-pound rail, 39 feet in length, laid new in 1946 and 1951, respectively, on an average of 22 treated ties to the rail length It is fully tieplated with double-shoulder tie plates, and is provided with 6-hole, 38-½-inch joint bars, and an average of 8 rail anchors per rail It is ballasted with crushed stone to a depth of 18 inches below the bottoms of the ties

This carrier's operating rules read in part as follows

> 76 Members of crew, as frequently as opportunity permits, must observe engines and cars in their train, moving and standing, to detect any conditions that might interfere with the safe movement of trains
>
> 77 So far as practicable and other duties permit, employes will observe passing trains for defects and should there be any indication of conditions endangering the train they must take necessary measures for its protection
>
> Members of crew on moving trains will look for signals when passing other trains and while passing stations, highway crossings where watchmen are on duty and points where trackmen and other employes are working and when practicable, exchange hand signals with them

The maximum authorized speed for passenger trains in the vicinity of the point of accident is 70 miles per hour, but it is restricted to 60 miles per hour on the first curve west of Mace

Description of Accident

No 54, an eastbound first-class passenger train, consisted of diesel-electric units 5704A, 5801A, and 5806A, coupled in multiple-unit control, 2 baggage-express cars, 1 baggage-mail car,

1 baggage-express car, 3 coaches, 1 dining car, 3 sleeping cars, and 2 lounge cars, in the order named. The cars were of all-steel construction The diesel-electric units, and the 5th to the 13th cars, inclusive, were equipped with tightlock couplers This train departed from Crestline, Ohio, 6 9 miles west of Toledo Jct , at 5 06 a m , 9 minutes ahead of scheduled time, passed Orrville, the last open office, 11 8 miles west of Newman, at 6 12 a m , 8 minutes ahead of scheduled time, and while moving on track No 1 at a speed of about 43 miles per hour, as indicated by the tape of the speed-recording device, the rear wheels of the front truck of the 8th car were derailed at a point 34 feet east of the west switch of the siding at Newman About 1 4 miles farther eastward, while the train was moving at an estimated speed of 15 miles per hour, the other wheels of the 8th car, the 7th car, and the 9th to the 12th cars, inclusive, were derailed

No separations occurred between units of the train The train stopped with the locomotive 1,368 feet east of the point of general derailment The derailed cars stopped in various positions as shown in the sketch The 8th car was somewhat damaged The other derailed cars were slightly damaged

The weather was clear at the time of the accident, which occurred about 6 26 a m

The eighth car, PRR 4477, was built in 1922 Its lightweight is 153,800 pounds It is 82 feet 3-3/4 inches long between buffers, and is provided with two 4-wheel trucks spaced 56 feet 3 inches between truck centers The trucks have a wheelbase of 9 feet and are equipped with 6-½ by 12-inch journals and multiple-wear 36-inch steel wheels The journals are equipped with oil lubricated roller bearings The capacity of each journal box when filled to the maximum oil level is 2-1/8 quarts Full elliptical and helical springs are provided at the truck bolsters, and helical springs are provided on truck equalizers

Discussion

On the day of the accident an eastbound freight train stalled on a grade on track No 1 east of Mace To prevent a delay to No 54, the train dispatcher decided to operate that train against the current of traffic on track No 2 between Mace and McKinley, 8 6 miles east of Mace He issued the required train orders to the operators at Mace and McKinley, and instructed the operator at Orrville to notify the crew of No 54 The operator at Orrville notified the crew of the intended movement by radio-telephone when the train was in the vicinity of Orrville

As No 54 was approaching Mace the speed was being reduced in accordance with signal indications The enginemen were in the control compartment at the front of the locomotive, and the members of the train crew were at various locations in the cars of the train The brakes of this train had been tested and had functioned properly when used en route Members of the crew said that they made frequent observations of the train en route from Crestline to Mace, and that they observed nothing to indicate a defective condition of the equipment The flagman said that two westbound freight trains passed the train between Crestline and Orrville and that a member of the crew on the caboose of each train gave a "Proceed" signal The south side of the train was observed by five operators between Crestline and Mace, when the train passed their respective stations, and none of these employees observed anything to indicate defective equipment

The enginemen said that the speed of the train was reduced to approximately 15 miles per hour when it proceeded over the crossover at Mace and entered track No 2 They said that after entering track No 2, and shortly after the fireman received a train order from the operator, authorizing

the movement against the current of traffic, the brakes of the train became applied in emergency The operator said he did not observe that a car of the train was derailed until after he had delivered the train order to the fireman As the train was approaching Mace the conductor and the flagman were in the vestibule at the east end of the 13th car The flagman said that as the train proceeded over the crossover he observed that a car of the train was derailed and he so informed the conductor The conductor immediately applied the brakes of the train in emergency by operating the emergency brake valve in the 13th car The brakeman-ticket collector said that he walked through the dining car when the train was about 13 miles west of Mace, and that he did not observe anything unusual He said that afterward, while he was in the 5th car, a dining-car employee entered the car and informed him that there was something wrong with the dining car The brakeman-ticket collector immediately proceeded toward the rear of the train, and when he entered the 7th car he heard a noise indicating that equipment of the train had became derailed He said that the train stopped before he could operate the emergency brake valve located in the 7th car

Examination of the track structure after the accident occurred did not disclose any condition which could have caused, or contributed to the cause of, the derailment A dragging mark was found on a rail brace of the south stock rail at a point 20 feet east of the west-siding switch at Newman, apparently caused when struck by a truck equalizer There was a flange mark on the base of the curved closure rail on the north side beginning at a point 34 feet east of the switch and extending eastward about 2 feet Opposite this mark there was a dragging mark on the head of the south stock rail, indicating that the equalizer had crossed the rail Between this location and the crossover at Mace, there were intermittent flange marks along the south side of the north rail and dragging marks along the south side of the south rail Marks in the vicinity of the crossover indicated that the equalizer crossed the south stock rail of the west turnout of the crossover and then moved along the gage side of the north rail of track No 1 to the point where the general derailment occurred The B&O-PRR crossing at Mace was damaged and displaced about one foot southward. Tracks Nos 1 and 2 were destroyed throughout distances of 470 feet and 100 feet, respectively, east of the crossing

Examination of the equipment after the accident occurred disclosed that the right rear journal of the front truck of PRR 4477 had broken inside the roller-bearing inner race approximately 2-3/4 inches from the fillet of the journal The journal, the journal box, and the roller-bearing assembly showed indications of excessive heating The roller paths on the inner race were scored and the race was badly damaged Score marks on the inside of the race indicated that the journal had rotated in the race The cages were badly damaged The rollers were worn flat, and several were found loose in the box The outer races were in place in the box, and the roller paths of these races were scored lightly The excessive heating of the roller bearing assembly destroyed any evidence which would indicate the condition of lubrication at the time the failure occurred

Examination of the right equalizer of the front truck disclosed that the bottom and sides at the rear end were scored from contact with the track structure It is evident that after the journal was broken, wear and flow of metal resulting from the friction of contact between the broken end of the axle and portions of the journal-box assembly had continued until the broken end of the axle worked free from the box The rear end of the equalizer then dropped sufficiently to come in contact with the track structure After this occurred, the north wheel acted as a fulcrum and the concentration of weight on the north journal raised the mate wheel a sufficient distance from the rail to permit the north wheel to drop inside the rail

The pair of wheels involved was applied to car PRR 4477 at Sunnyside, N Y , on November 28, 1958 Examination of these wheels did not disclose any condition which could have contributed to the failure of the journal

The axle involved was manufactured in 1949 and it was heat treated in a shop of the carrier before it was placed in service It was last magnetic-particle tested on March 20, 1956, and no defects were found Tests conducted after the accident occurred disclosed that the chemical composition and the physical properties of the axle were in accordance with the carrier's specifications

The roller-bearing assembly of the failed journal was first placed in service on December 21, 1954, when it was applied to the journal involved It was last disassembled and inspected on March 20, 1956, and no defects were found The carrier did not receive any reports of overheating of this journal bearing from the time it was placed in service until the accident occurred Oil was last added to the journal box at Chicago, Ill , on April 5, 1959 The records of the carrier indicate that the box was filled to the maximum level at that time but do not show the amount of oil added The equipment of No 54 was inspected by car inspectors at Chicago before the train departed and at Fort Wayne, Ind , and no exceptions were taken A car inspector at Crestline said that an inspection of the train at that point disclosed no indication of overheating of the journal involved

Laboratory examination of the failed journal bearing disclosed that the inner race and the rollers had been subjected to excessive heating Both cages were broken, which permitted bunching of the rollers The journal rotated in the inner race and was overheated throughout its entire length It was scored and overheated to the extent that it broke about 2 3/4 inches from the fillet There was no evidence of oil leakage from the journal box Because of the extent of damage to the bearing, the cause of its failure could not be determined

Cause

This accident was caused by a broken journal due to overheating

Dated at Washington, D C , this sixth day of August, 1959

By the Commission, Commissioner Freas

(SEAL)

HAROLD D McCOY,
Secretary