

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2511
THE PENNSYLVANIA RAILROAD COMPANY
REPORT IN RE ACCIDENT
NEAR NORTH JACKSON, OHIO, ON
JUNE 28, 1941

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SUMMARY

Railroad:	Pennsylvania
Date:	June 28, 1941
Location:	North Jackson, Ohio
Kind of accident:	Derailment
Train involved:	Freight
Train number:	Extra 9704 East
Engine number:	9704
Consist:	35 cars and caboose
Speed:	40 m. p. h.
Operation:	Timetable, train orders and manual-block system
Track:	Single; 2° curve to left; grade level
Weather:	Clear
Time:	3:42 a. m.
Casualties:	2 killed; 1 injured
Cause:	Accident caused by irregularity in surface and alinement of track

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2511

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

THE PENNSYLVANIA RAILROAD COMPANY

September 12, 1941

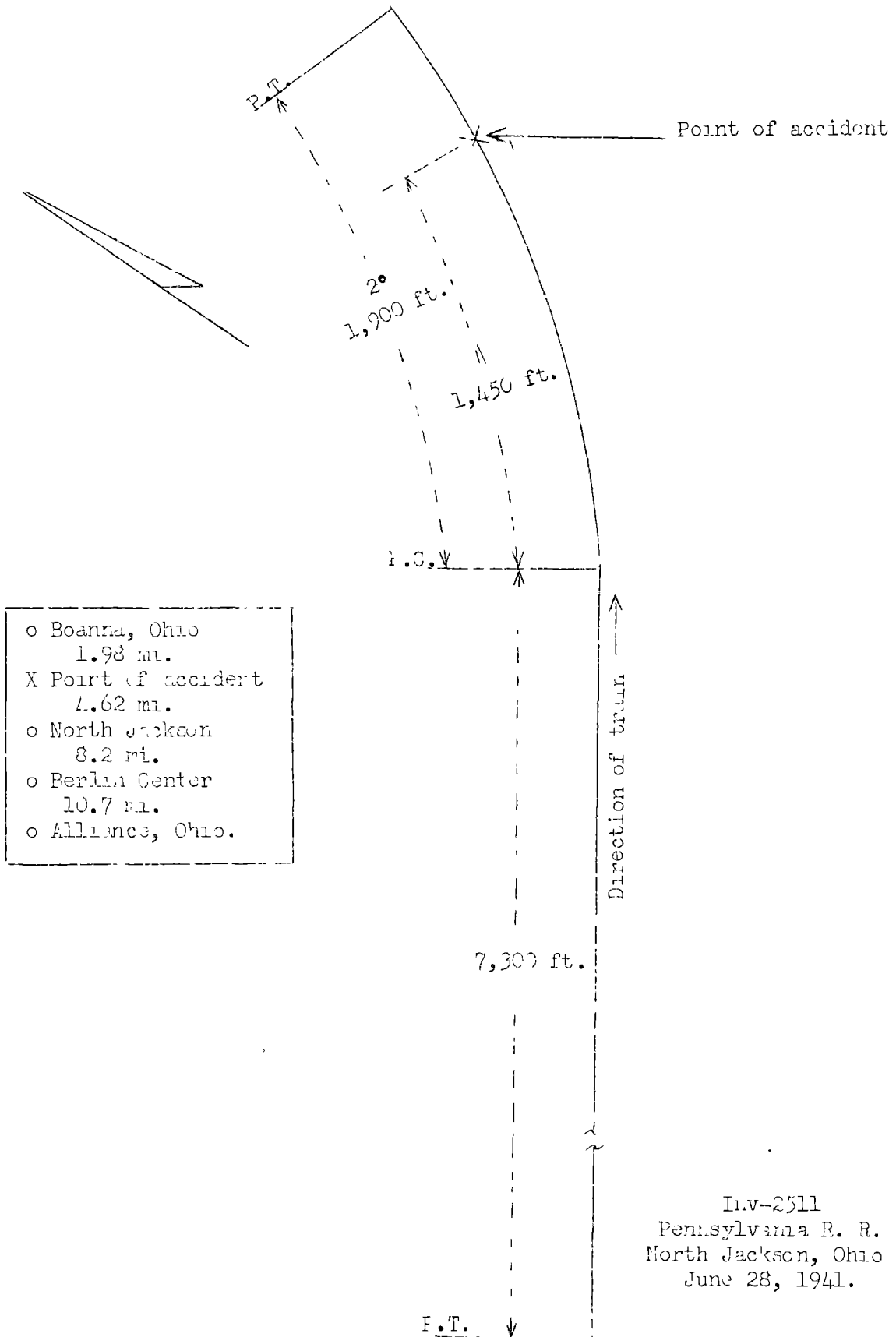
Accident near North Jackson, Ohio, on June 28, 1941, caused
by irregularity in surface and alinement of track.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On June 28, 1941, there was a derailment of a freight train on the Pennsylvania Railroad near North Jackson, Ohio, which resulted in the death of two employees and the injury of one employee.

¹Under 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-2511
Pennsylvania R. R.
North Jackson, Ohio
June 28, 1941.

Location of Accident and Method of Operation

This accident occurred on that part of the Erie & Ashtabula Division designated as the Alliance Branch, which extends between Alliance and Boanna, Ohio, a distance of 25.5 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders and a manual-block system. The accident occurred at a point 4.62 miles east of North Jackson. As the point of accident is approached from the west there is a tangent 7,300 feet in length, which is followed by a 2° curve to the left 1,450 feet to the point of accident and 450 feet beyond. The grade for east-bound trains varies between 0.29 and 0.69 percent descending a distance of more than 6 miles, then is 0.40 percent descending 82 feet, 0.11 percent descending 100 feet and level 62.5 feet to the point of accident.

On the curve involved the track structure consists of 100-pound P. S. rails, some of which were rolled in 1924 and the remainder in 1926, cropped to 37 feet in length, and relaid in 1937 on an average of 19 treated ties to the rail length; it is fully tieplated, double-spiked on the inside of the rail and single-spiked on the outside, provided with five rail anchors per rail length, and is ballasted with cinders to a depth of 3 feet 3 inches. The maximum superelevation was 4 inches and the gage varied between 4 feet 8-1/2 inches and 4 feet 9 inches. The superelevation at the point of derailment was 2-3/4 inches.

In the vicinity of the point of accident the track is laid on a fill 4,052 feet in length. At the point of accident the base of the fill is 55 feet wide and the fill is composed of slag 4 feet 6 inches in height on top of which are cinders to a depth of 3 feet 3 inches. On the outside of the curve the ballast extends 6 feet beyond the ends of the ties.

Rule 902 of the Specifications for Standard Track of the Pennsylvania Railroad reads in part as follows:

902. Any track must be regarded as unsafe for the passage of trains at authorized speed when any of the following conditions exist:

* * *

For speeds up to and including
50 miles per hour--

* * *

If the super-elevation on curves (between spirals) varies more than 1/2 inch in 31 feet from that designated; or

If the difference in the cross-level of rails on tangents or super-elevation on curves (between spirals) is more than 1/2 inch at any two points less than 62 feet apart; * * *

At the point of accident the maximum authorized speed for freight trains is 40 miles per hour.

Description of Accident

Extra 9704, symbol CC-2, an east-bound freight train, consisted of engine 9704, of the 2-10-2 type, 29 loaded and 6 empty cars and a caboose. This train departed from Berlin Center, 8.2 miles west of North Jackson, at 3:07 a. m., according to the statement of the conductor. While the train was moving on a curve to the left at a speed estimated as 40 miles per hour the engine was derailed to the right at a point 1,450 feet east of the west end of the curve. The maximum authorized speed on this curve for the train involved was 40 miles per hour.

The engine was in good mechanical condition and there was no indication of dragging equipment or of any obstruction having been on the track. The specified curvature was 2°00' and the specified superelevation was 2-3/4 inches. The No. 1 pair of driving wheels were the first to be derailed. The first mark on the track structure was a flange mark on the head of the high rail, beginning at the gage side and extending diagonally eastward and outward a distance of 5 feet 3 inches. Flange marks then appeared intermittently outside the high rail, on the base, throughout a distance of 65 feet 4-1/2 inches, at the east end of which the right wheel struck an outside angle bar and the flange was deflected to the top of the rail. At a point 33 feet 5-1/2 inches farther east this wheel again dropped outside the high rail and, at a point 41 feet beyond, the engine crossed the high rail and overturned to the left. Marks inside the low rail began at a point 3 feet 4 inches east of the west end of the diagonal mark on the high rail and were continuous to the point where the engine crossed the track to the left.

Engine 9704 stopped, badly damaged, on its left side north of the track and parallel to it, with its front end 443 feet beyond the point of derailment. The cab was crushed and the steam-supply pipe to the stoker engine was broken at its con-

nection with the emergency starting-valve. The tender, remaining coupled to the engine, was derailed to the left and stopped on its left side at a 30-degree angle to the track; both trucks were detached and the underframe was bent. The first fifteen cars were derailed and stopped, badly damaged, in various positions across the track and on both sides of it; seven cars were destroyed. The front truck of the sixteenth car was derailed. The wreckage was contained within a distance of 268 feet.

The weather was clear at the time of the accident, which occurred at 3:42 a. m.

The employees killed were the engineman and the fireman, and the employee injured was the front brakemen.

Mechanical Data

Back-to-back measurements of the wheels of the engine and tender were as follows:

Wheels	Position 1	Position 2	Position 3	Position 4
Engine truck	53.215	53.216	53.217	53.216
No. 1 driving	52.910	52.914	52.915	52.912
No. 2 driving	53.120	53.110	53.114	53.111
No. 3 driving	52.625	52.625	52.625	52.625
No. 4 driving	53.250	53.312	53.250	53.250
No. 5 driving	53.125	53.125	53.013	53.010
Trailer truck	53.317	53.310	53.306	53.307
No. 1 tender truck	53.212	53.224	53.210	53.218
No. 2 tender truck	53.213	53.206	53.224	53.305
No. 3 tender truck	53.302	53.106	53.207	53.217
No. 4 tender truck	53.213	53.219	53.224	53.216

Note: The No. 3 pair of driving wheels was equipped with plain tires. The axle of the No. 3 pair of tender-truck wheels was bent as a result of the derailment.

The total weight of engine 9704 is 435,000 pounds, distributed as follows: Engine truck, 25,000 pounds; No. 1 pair of driving wheels, 70,300 pounds; No. 2 pair of driving wheels, 69,000 pounds; No. 3 pair of driving wheels, 75,600 pounds; No. 4 pair of driving wheels, 65,500 pounds; No. 5 pair of driving wheels, 70,600 pounds; trailer truck, 59,000 pounds.

The diameters of the engine-truck wheels, the driving wheels, and the trailer-truck wheels are, respectively, 32, 62, and 36 inches. The Nos. 1 and 5 pairs of driving wheels are equipped with floating boxes. The tender is rectangular in shape and is equipped with two 4-wheel trucks. The weight of the tender loaded is 206,100 pounds. The rigid wheel-base of the engine is 22 feet 2 inches in length and the total length of the wheel base is 41 feet 11-1/2 inches. The total length of the engine and tender is 91 feet 4-5/8 inches. The last Class 3 repairs were made at Juniata Shops, Pa., July 18, 1940. The engine was stored November 9, 1940, and returned to service on April 24, 1941. The last monthly certificate was received at Canton, Ohio, June 24, 1941. The accumulated mileage since the last class repairs was 12,808 miles.

Track Data

Measurements of the track taken throughout a distance of 155 feet immediately west of the point of derailment were as follows:

Distance west
of point of
derailment

	<u>Superelevation</u>	<u>Gage</u>	<u>Curvature</u>
155 feet	3-1/8 inches	4 feet 8-1/2 inches	1°00'
139 feet 6 inches	3-3/8 inches	4 feet 8-5/8 inches	2°00'
124 feet	3-1/4 inches	4 feet 8-1/2 inches	0°45'
108 feet 6 inches	3-1/4 inches	4 feet 8-3/4 inches	2°00'
93 feet	3-1/2 inches	4 feet 8-7/8 inches	2°00'
77 feet 6 inches	3-3/4 inches	4 feet 9 inches	1°30'
62 feet	4 inches	4 feet 8-5/8 inches	1°00'
46 feet 6 inches	4 inches	4 feet 8-5/8 inches	1°30'
31 feet	3-1/2 inches	4 feet 8-7/8 inches	2°00'
15 feet 6 inches	3-1/8 inches	4 feet 8-3/4 inches	2°00'
Point of Derailment	2-3/4 inches	4 feet 8-3/4 inches	2°30'

On the same section of track and with an engine standing just west of each station, the measurements were as follows:

	<u>Distance west of point of derailment</u>	<u>Superelevation</u>
	155 feet	3-1/4 inches
	139 feet 6 inches	3-1/2 inches
	124 feet	3-3/8 inches
L.S.	104 feet 10 inches	3-3/8 inches
	108 feet 6 inches	3-1/4 inches
H.S.	101 feet 9 inches	3-3/8 inches
	93 feet	3-5/8 inches
L.S.	83 feet 3 inches	3-5/8 inches
	77 feet 6 inches	3-3/4 inches
H.S.	64 feet 9-1/2 inches	4 inches
	62 feet	4 inches
	46 feet 6 inches	4 inches
	31 feet	3-1/2 inches
H.S.	27 feet 10 inches	3-3/8 inches
	15 feet 6 inches	3-1/4 inches
L.S.	9 feet 2 inches	3 inches
	0 Point of derailment.	2-3/4 inches

Note: L.S. is joint of low rail;
H.S. is joint of high rail.

The south rail at the point of accident was B. S. Co. Lackawanna - V 1926 rail, cropped in November, 1937. Measurements disclosed this rail to be 5-9/16 inches in height and indicated wear and cold-rolling of 1/16 inch. On the gage side of the head at a point 7/16 inch below the top surface there was a lip extending 1/8 inch outward.

Discussion

The investigation discloses that the curvature was specified as 2°00' and the superelevation was specified as 2-3/4 inches, but according to measurements of the track throughout a distance of 155 feet immediately west of the point of derailment the curvature varied from 0°45' to 2°30' and the superelevation varied from 2-3/4 inches to 4 inches. At three adjacent stations at intervals of 15-1/2 feet the curvature ranged from 2°00' to 0°45' and again to 2°00'. There were other irregularities in the curvature almost as great. At one section immediately west of the point of accident the superelevation decreased from 4 inches to 2-3/4 inches within a distance of 46 feet 6 inches. This variation was considerably in excess of the carrier's specifications. The variations in cross-levels were the result of soft spots under the low rail. Undoubtedly the irregularities in curvature caused the engine to pivot laterally and the irregularities in surface

caused the engine to roll laterally. The variations in surface and alinement were sufficient to cause the right front driving wheel, which would be bearing heavily against the gage side of the high rail, to be raised high enough for its flange to climb the high rail.

During rainy weather the section foreman had difficulty in keeping the track on this curve in proper surface and alinement because of soft spots under the low rail. It had rained considerably during the 30 days immediately preceding the day of the accident. The condition of the track was such that during the month of June it was necessary that the section foreman and gang spend about 20 percent of the time on the maintenance of this curve, which comprised less than 0.04 percent of the section. The section foreman said that the track was in good surface when he took cross-levels on this curve during the day before the accident occurred. He performed the last work on the curve on June 23. In the past this curve had often been found to be irregular in surface and alinement immediately after a heavy train traversed it.

Cause .

It is found that this accident was caused by irregularity in surface and alinement of the track.

Dated at Washington, D. C., this twelfth
day of September, 1941.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.