

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2708
THE SOUTHERN RAILWAY SYSTEM
REPORT IN RE ACCIDENT
NEAR RALEIGH, N. C., ON
JULY 10, 1943

SUMMARY

Railroad:	Southern
Date:	July 10, 1943
Location:	Raleigh, N. C.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	22
Engine number:	1321
Consist:	3 cars
Estimated speed:	35-55 m. p. h.
Operation:	Interlocking
Track:	Single; 9° curve; 0.85 percent descending grade eastward
Weather:	Cloudy
Time:	10:20 p. m.
Casualties:	2 killed; 5 injured
Cause:	Excessive speed on sharp curve

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2708

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

THE SOUTHERN RAILWAY SYSTEM

August 10, 1943.

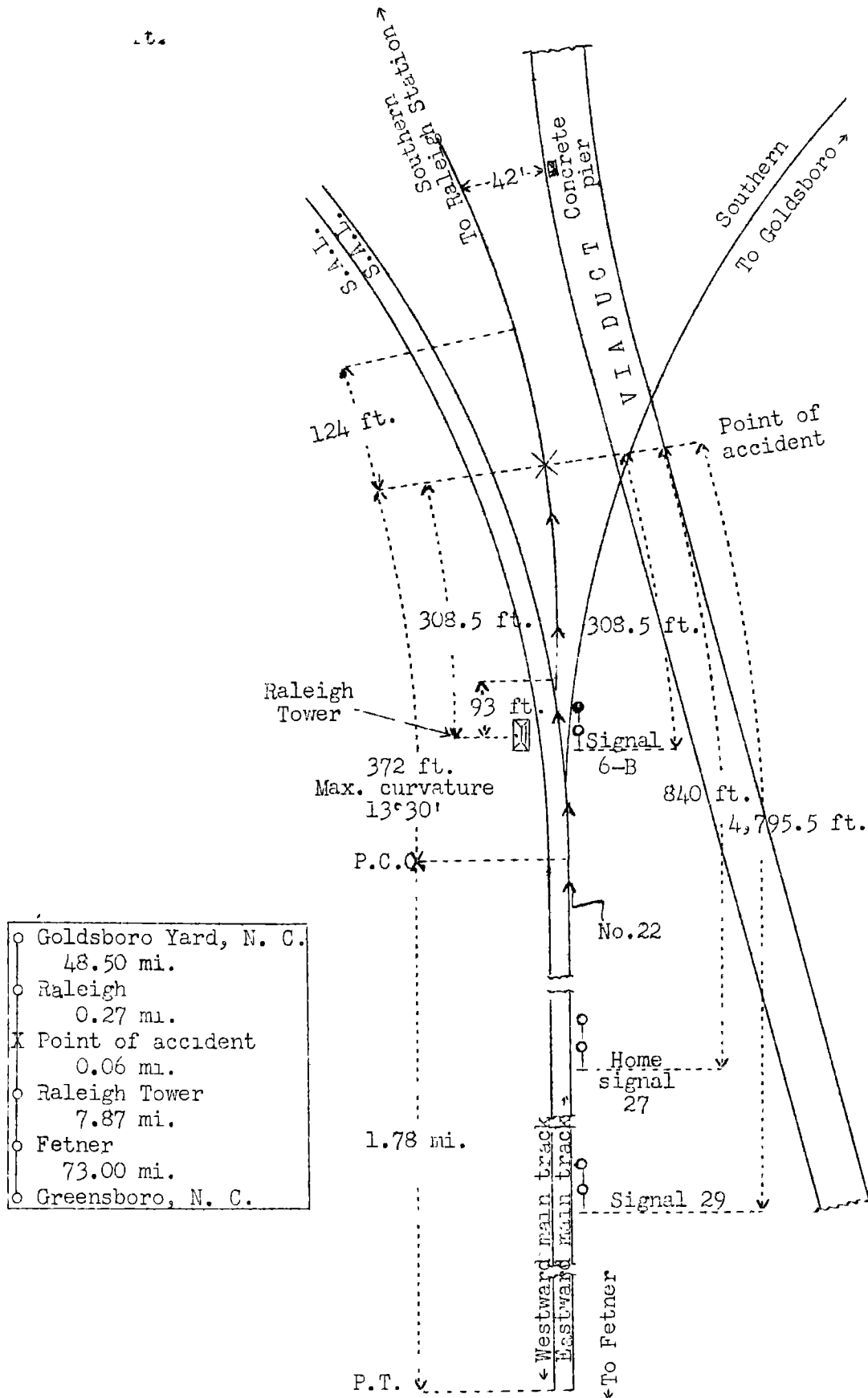
Accident near Raleigh, N. C., on July 10, 1943, caused by
excessive speed on a sharp curve.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On July 10, 1943, there was a derailment of a passenger train on the line of the Southern Railway System near Raleigh, N. C., which resulted in the death of two train-service employees and the injury of three passengers and two railway-mail clerks.

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. No. 2708
Southern Railway
Raleigh, N. C.
July 10, 1943

Location of Accident and Method of Operation

This accident occurred on that part of the Danville Division which extended between Greensboro and Goldsboro Yard, N. C., 129.7 miles. Between Fetner, 73 miles east of Greensboro, and Raleigh Tower, a distance of 7.87 miles, this was a double-track line used jointly by the Seaboard Air Line Railway and the Southern Railway, and operated by the Seaboard Air Line Railway. Between Fetner and Raleigh Tower trains moving with the current of traffic were operated by an automatic block-signal system, the indications of which superseded time-table superiority. Passenger trains of the Southern Railway en route to the station at Raleigh entered a spur track 1,634.5 feet in length. Entry to this track from the eastward main track was made through a facing-point switch located 93 feet east of Raleigh Tower. The spur-track switch was within interlocking limits and the interlocking was controlled from Raleigh Tower. The accident occurred on the spur track 303.5 feet east of Raleigh Tower and 1,419 feet west of the station at Raleigh. Approaching from the west there was a tangent 1.78 miles in length, which was followed by a compound curve to the left 496 feet in length, the curvature of which varied between $0^{\circ}42'$ and $13^{\circ}30'$. The derailment occurred 372 feet from the western end of the curve where the curvature was 9° . Throughout a distance of 3.14 miles immediately west of Raleigh, the grade for east-bound trains was descending and varied between 0.62 percent and 1.17 percent. At the point of accident the grade was 0.85 percent descending eastward.

On the curve involved the track structure consisted of 100-pound rail of various lengths, relaid in 1940 on an average of 24 hardwood ties to each 39-foot length. It was fully tieplated, double-spiked, provided with 3 rail anchors for each 39 feet of rail, and laid on 10 inches of chat and cinder ballast. The maximum superelevation on the curve was 1-1/2 inches and the gage varied between 4 feet 8-1/2 inches and 4 feet 9 inches. At the point of accident the superelevation was 1-1/8 inches, and the gage was 4 feet 2 inches.

Semi-automatic signal 1580, governing east-bound movements on the eastward main track, home signal 27, governing east-bound movements through the interlocking, and home signal 3-B, governing east-bound movements from the eastward main track to the spur track, were located, respectively, 4,795.5 feet, 840 feet and 308.5 feet west of the point of accident. These signals were of the color-light type, and were continuously lighted. The involved aspects and corresponding indications and names of these signals were as follows:

	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
Signal 1580	Green-over-red	Proceed	Proceed-Signal
Signal 27	Yellow-over-red	Approach next signal prepared to stop	Approach-Signal
Signal 6-B	Red-over-yellow	Proceed at restricted speed prepared to stop	Restricting-Signal

The interlocking machine was of the electro-mechanical type and consisted of 21 working levers in a 32-lever frame. Approach locking and detector locking were provided. Time releases for the approach locking on the eastward main track at signal 6-B was set for 2 minutes 15 seconds.

DEFINITIONS.

* * *

Restricted Speed--Proceed prepared to stop short of train, obstruction, or anything that may require the speed of a train to be reduced.

The maximum authorized speed for passenger trains between Fethner and Raleigh interlocking was 55 miles per hour, and through the interlocking 10 miles per hour.

Description of Accident

No. 22, an east-bound first-class passenger train, consisted of engine 1321, of the 4-6-2 type, one mail-baggage car, one baggage car, one passenger-baggage car, three coaches, one Pullman sleeping car and one coach, in the order named. All cars were of steel construction. After a terminal air-brake test was made this train departed from Greensboro, 81.2 miles west of Raleigh, at 7:45 p. m., according to the dispatcher's record of movement of trains, 45 minutes late, passed Fethner, 8.2 miles west of Raleigh, at 10:09 p. m., 49 minutes late, passed signal 1580, which displayed green-over-red, passed signal 27, which displayed yellow-over-red, passed signal 6-B, which displayed red-over-yellow, entered the spur-track switch, and while moving at a speed variously estimated as 35 to 55 miles per hour the engine and the first three cars and the front wheels of the rear truck of the fifth car were derailed.

Engine 1321 was derailed to the south and struck a concrete pier of a viaduct which paralleled the spur track on the south. The pier was located 42 feet south of the centerline of the spur track. The engine stopped on its right side, with the front end 235 feet east of the point of derailment and 32 feet south of the track. The engine truck was detached, the cab was demolished, steam and water pipes were broken, and the engine was otherwise badly damaged. The tender, remaining coupled to the engine, was derailed and stopped on its right side, badly damaged, and at an angle of about 45 degrees to the engine. The first car became separated from the tender and the second car and stopped on its left side across the spur track, with its front end against the front end of the engine and at an angle of about 45 degrees to it. The second car stopped across the spur track, with its front end against the rear end of the first car, and leaned to the right at an angle of about 30 degrees. The third car stopped practically upright, across the spur track, with its front end against the tender of the engine. These cars were badly damaged.

It was cloudy at the time of the accident, which occurred about 10:20 p. m.

The engineer and the fireman were killed.

After the accident, an inspection of engine 1321 disclosed that the throttle valve was fully open. Because of damage to the interior of the engine cab, the position of the reverse lever and the brake valves at the time of the accident could not be determined. There were slid-flat spots on all driving-wheel tires, some of which were 2 inches long. The right No. 2 driving-wheel tire was displaced about 2 inches as a result of the derailment. There was no indication of defective condition of the engine prior to the accident. Tests were made of the air-brake equipment of the engine and it functioned as intended. All angle cocks were in position to permit the flow of air through the brake pipes. There was no condition found that would prevent the proper application of the train brakes.

The total weight of engine 1321 in working order was 232,000 pounds. The diameter of the engine-truck wheels, driving wheels and trailer-truck wheels were, respectively, 33 inches, 72-1/2 inches and 42 inches. The tender was equipped with four-wheel trucks. The rigid wheelbase of the engine was 12 feet 6 inches long, and the total length of the engine and tender was 78 feet 4-7/8 inches. The center of gravity was about 74 inches above the top of the rails.

After the accident, measurements of the track taken throughout a distance of 372 feet west of the point of accident were as follows:

<u>Distance west of point of accident</u>	<u>Superelevation</u>	<u>Gage</u>	<u>Curvature</u>
<u>Feet</u>	<u>Inches</u>	<u>Feet</u>	<u>Degrees</u>
372		4	8-1/2 0°12'
341		4	8-1/2 0°42'
310	5/8	4	8-1/2 3°06'
279	7/8	4	9 7°43'
248	5/8	4	9 10°13'
217	1/2	4	8-7/8 2°12'
186	3/4	4	8-7/8 0°54'
155	1-1/8	4	9 5°06'
124	3/4	4	9 11°48'
93	1-1/4	4	9 13°30'
62	1-1/4	4	8-7/8 12°30'
31	1-1/2	4	9 12°12'
Point of accident	1-1/8	4	9 9°00'

Discussion

No. 22 was moving at a speed estimated by the crew as 35 to 40 miles per hour and by other witnesses as 50 to 55 miles per hour when the engine and first three cars became derailed on a compound curve to the left, the maximum curvature of which was 13°30' and the maximum superelevation 1-1/2 inches. Signal 27, located at the western limits of the interlocking 840 feet west of the point of derailment, displayed an indication which required the train to approach the next signal prepared to stop, and signal 6-B, located 531.5 feet east of signal 27, displayed an indication which required the speed to be so controlled that it could be stopped short of a train or an obstruction. The authorized speed of trains moving within the limits of the interlocking was limited to 10 miles per hour.

As No. 22 was approaching Raleigh Tower, the conductor was engaged in performing clerical duties and the other members of the train crew were making preparation to handle traffic at the station at Raleigh. They were not aware of anything being wrong until No. 22 reached a point about 100 feet west of Raleigh Tower, then the brakes became applied in emergency and the accident occurred immediately afterward. The leverman at Raleigh Tower said that several minutes prior to the time the accident occurred he lined the route for No. 22 to pass through the interlocking. He observed fire flying from the driving wheels as the engine passed the tower at a speed he estimated as 50 to 55 miles per hour. It could not be determined why the enginemen failed to take action to control the speed of No. 22 through the interlocking in accordance with the speed restriction of 10 miles per hour, as they were

killed in the accident. There was no defective condition of the engine prior to the accident, and there was no indication of dragging equipment, defective track, or of any obstruction having been on the track. The brakes of No. 22 had been tested and they functioned properly.

After the accident, examination of the track disclosed that the first mark on the track structure was a tread mark on the outside edge of the head of the high rail. This mark started about 95 feet west of the point of derailment, where the curvature was $13^{\circ}30'$ and superelevation $1\text{-}1/4$ inches, and continued to the point of derailment. Immediately beyond this point a flange mark made by a wheel leaning outward appeared on the ties outside the high rail, and, about 53 feet beyond, a tread mark appeared on the ties. Eastward from the latter point the track was torn up a distance of 110 feet. Measurements of the track throughout a distance of 372 feet immediately west of the point of derailment disclosed that the curvature varied from $0^{\circ}12'$ to $13^{\circ}30'$. At stations 248 feet, 186 feet and 93 feet west of the point of derailment the curvature was, respectively, $10^{\circ}18'$, $0^{\circ}54'$ and $13^{\circ}30'$, and at the point of derailment it was $0^{\circ}00'$. Between stations 124 and 93 feet west of the point of derailment the surface varied $1/2$ inch. These variations would cause the engine to pivot and to roll laterally. According to A. R. E. A. tables, the overturning speed based on a center of gravity of 84 inches on a $13^{\circ}30'$ curve having a $1\text{-}1/2$ -inch superelevation is about 47 miles per hour. The engine overturned to the outside of the curve without marking the ties between the rails, and without making a flange mark on the head of the outside rail.

Cause

It is found that this accident was caused by excessive speed on a sharp curve.

Dated at Washington, D. C., this tenth day of August, 1943.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.