

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2530
THE NORFOLK SOUTHERN RAILROAD COMPANY
REPORT IN RE ACCIDENT
NEAR OAKBORO, N. C., ON
SEPTEMBER 24, 1941

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SUMMARY

Railroad: Norfolk Southern
Date: September 24, 1941
Location: Oakboro, N. C.
Kind of accident: Derailment
Train involved: Freight
Train number: 62
Engine number: 601
Consist: 20 cars, caboose
Estimated speed: 25 m.p.h.
Operation: Timetable and train orders
Track: Single; 4° curve to right; 1.1
percent ascending grade northward
Weather: Clear, hot
Time: About 1:25 p.m.
Casualties: 3 killed; 1 injured
Cause: Kinked track

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2530

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

THE NORFOLK SOUTHERN RAILROAD COMPANY

November 29, 1941

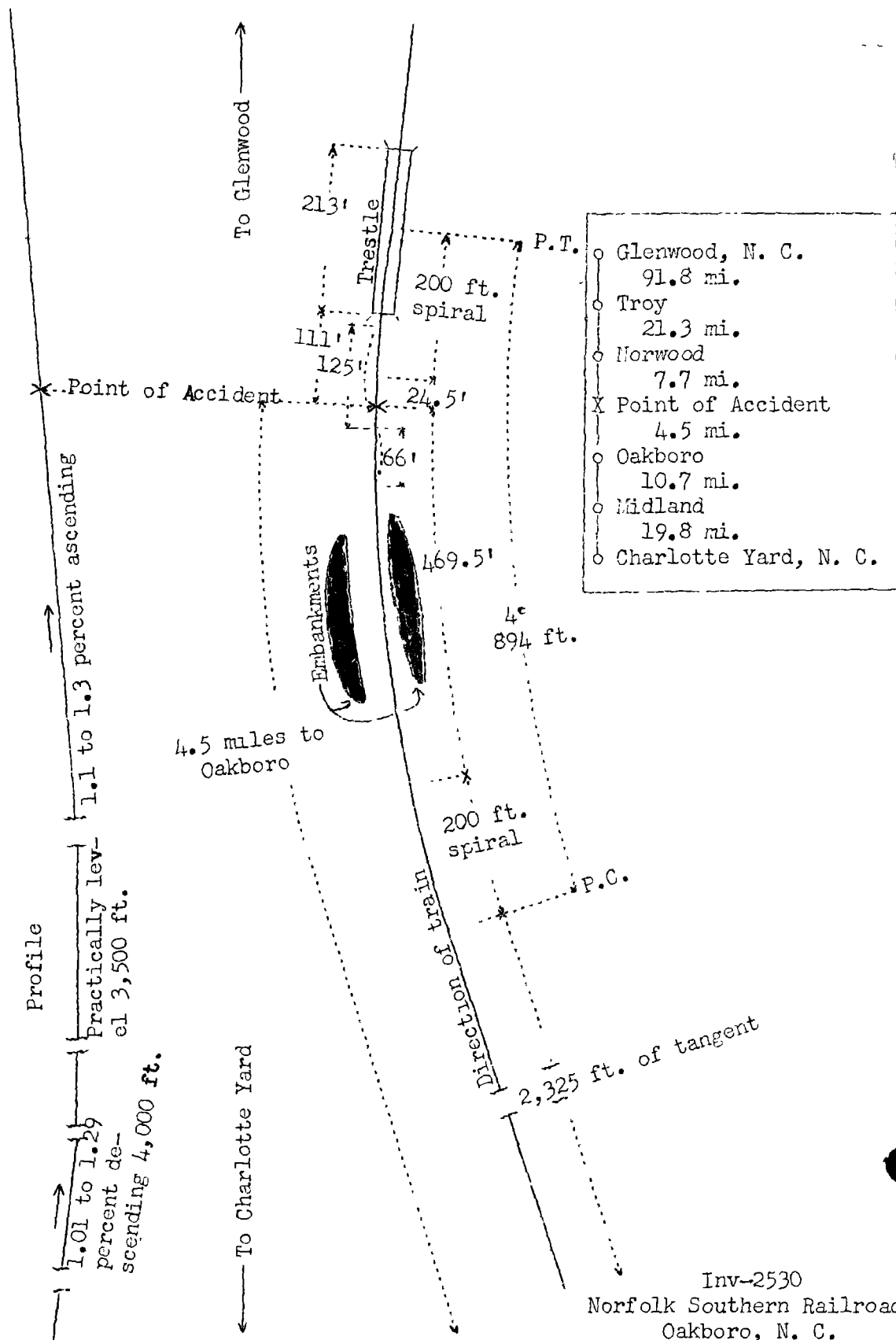
Accident near Oakboro, N. C., on September 24, 1941, caused by
kinked track.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On September 24, 1941, there was a derailment of a freight train on the Norfolk Southern Railroad near Oakboro, N. C., which resulted in the death of two employees and one trespasser and the injury of one employee.

¹ 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-2530
 Norfolk Southern Railroad
 Oakboro, N. C.
 September 24, 1941

Location of Accident and Method of Operation

This accident occurred on that part of the Western District extending between Charlotte Yard and Glenwood, N. C., a distance of 155.8 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable and train orders; there is no block system in use. The accident occurred at a point 4.5 miles north of Oakboro. As the point of accident is approached from the south there is a tangent 2,325 feet in length, which is followed by a 4° curve to the right 669.5 feet to the point of accident and 224.5 feet beyond. The grade for north-bound trains is, successively, 1.1 to 1.29 percent descending 4,000 feet, level 3,500 feet, and 1.1 to 1.3 percent ascending 1,685 feet to the point of accident and 2,500 feet beyond.

On the curve involved the track structure consists of 100-pound relay rail, 33 feet in length, laid in 1936, on an average of 20 ties to the rail length; it is fully tie-plated with single-shoulder canted tieplates, single-spiked, and equipped with 4-hole continuous angle bars 24 inches in length. Rail anchors are not used. The track is ballasted with sand and gravel to a depth of 6 to 8 inches. The cribs are about half full and the ballast extends about 5 inches beyond the ends of the ties. The maximum superelevation was $3\text{-}\frac{3}{4}$ inches and the gage varied between 4 feet $8\text{-}\frac{1}{4}$ inches and 4 feet 9 inches. At the point of derailment the superelevation was $3\text{-}\frac{1}{2}$ inches and the gage was 4 feet $8\text{-}\frac{3}{4}$ inches.

In the vicinity of the point of accident the track is laid in a cut, the east embankment of which is approximately 238 feet in length and $7\text{-}\frac{1}{2}$ feet in height. The derailment occurred about 100 feet north of the north end of this cut. The south embankment of a ravine about 47 feet in depth is located 111 feet north of the point of accident. At the time of the accident this ravine was spanned by a 15-bent wooden trestle 213 feet in length provided with outer guard-rails of 6-inch by 6-inch timbers, which were bolted to the tops of the ties. This trestle was designed for Cooper's E-50 rating.

The maximum authorized speed for the train involved was 25 miles per hour.

Description of Accident

No. 62, a north-bound second-class freight train, consisted at the time of the accident of engine 601, of the 2-8-4 type, 16 loaded and 4 empty cars and a caboose. This train departed from Charlotte Yard, 30.5 miles south of Oakboro, at 11:45 a.m., according to the dispatcher's record of movement of trains, 2 hours 15 minutes late, departed from

Oakboro, the last open office, at 1:15 p.m., 2 hours 5 minutes late, and, while moving on a curve to the right at an estimated speed of 25 miles per hour, the engine was derailed to the right.

Because of track curvature and the cut, the point where the accident occurred can be seen from the right side of a north-bound engine a distance of only 350 feet and cannot be seen from the left side.

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 equipment and the air brakes had been inspected prior to the time No. 62 departed from Charlotte Yard and no defective condition was disclosed. The air brakes functioned properly at all points where used en route.

Prior to the time of accident, a section of track 191 feet long within the curve involved was displaced. Northward from a point 585.5 feet north of the south end of the curve, the track was displaced throughout a distance of 66 feet. The maximum displacement was 17 inches to the east of the normal center-line. Immediately north of this section, the track was displaced to the west of the normal center-line throughout a distance of 125 feet. The maximum displacement was 32 inches. The maximum curvature of the first section was about $12^{\circ}00'$ to the right and of the second section about $12^{\circ}00'$ to the left. The derailment occurred at a point 18 feet north of the south end of the second section, at which point the displacement was 9 inches to the west of the normal center-line.

The first mark on the track structure was a wheel-tread mark on a spike head inside the low rail. Opposite this mark the high rail was canted outward throughout a distance of about 25 feet, then to the south abutment of the trestle the rail was completely turned over. On the fourth and eighth ties north of the first mark, flange marks appeared on the ties on the gage side of the low rail and near its base and on the gage side of the web of the high rail. Similar marks extended northward to the south abutment of the trestle. These marks indicated that the engine truck was the first to become derailed. The engine continued forward to the south abutment of the trestle, a distance of 111 feet, then continued over the trestle to the north abutment, a distance of 213 feet, and the engine, the tender and the first eight cars overturned to the right. The engine and tender remained coupled and stopped on their right sides, in line with the trestle and on the north embankment of the ravine.

The pilot was bent, the cab was destroyed and all piping on the right side of the cab was badly damaged. The tender was somewhat damaged. The first eight cars stopped in various positions at the bottom of the ravine and on the south embankment. The fourth and fifth cars were destroyed, and the remaining cars in this group were badly damaged. The ninth car was slightly damaged.

The track was destroyed from a point 45 feet north of the point of derailment to the south end of the trestle, a distance of 66 feet. The trestle was practically demolished as a result of the derailment.

The maximum temperature recorded at the U.S. Weather Bureau in Monroe, N.C., located approximately 23.5 miles southwest of Oakboro, was 93 degrees on September 24, 1941. The weather was clear at the time of the accident, which occurred about 1:25 p.m.

The employees killed were the engineer and the front brakeman, and the employee injured was the fireman.

Mechanical Data

After the accident an inspection of the engine disclosed that all flanges were of good contour, all driving-box wedges were lubricated and moved freely, and the buffer castings were well lubricated. The baffle plates in the tender cistern were in place but they had been buckled and cracked during the derailment.

The back-to-back measurements of the wheels of the engine were as follows:

<u>Wheel Location</u>	<u>First Position</u>	<u>Second Position</u>	<u>Third Position</u>
Engine truck	53-1/ 8"	53-5/32"	53-1/ 8"
No. 1 driving	53-7/32"	53-7/32"	53-7/32"
No. 2 driving	53-1/ 4"	53-1/ 4"	53-1/ 4"
No. 3 driving	53-5/16"	53-9/32"	53-5/16"
No. 4 driving	53-3/16"	53-9/32"	53-3/16"
Trailer truck			
No. 1	53-3/ 8"	53-3/ 8"	53-3/ 8"
No. 2	53-3/ 8"	53-3/ 8"	53-3/ 8"
No. 1 tender truck	53-3/ 8"	53-3/ 8"	53-3/ 8"
No. 2 tender truck	53-3/ 8"	53-3/ 8"	53-3/ 8"
No. 3 tender truck	53-3/ 8"	53-3/ 8"	53-3/ 8"
No. 4 tender truck	53-3/ 8"	53-3/ 8"	53-3/ 8"
No. 5 tender truck	53-7/32"	53-7/32"	53-7/32"
No. 6 tender truck	53-5/32"	53-5/32"	53-5/32"

The lateral motion of all wheels was within the prescribed limits.

The total weight of engine 601 in working order is 335,400 pounds, distributed as follows: Engine truck, 33,000 pounds; driving wheels, 202,900 pounds; and trailer truck, 99,500 pounds. The diameters of the engine-truck wheels and the driving wheels are, respectively, 33 and 63 inches, and of the trailer-truck wheels, 36 and 46 inches. The tender has two six-wheel trucks. The weight of the tender loaded is 200,000 pounds. The rigid wheelbase is 11 feet long and extends from the center of the No. 2 driving wheels to the center of the No. 4 driving wheels. The total length of the wheelbase is 39 feet. The total length of the engine and tender is 90 feet 4-3/8 inches. The last Class 5 repairs were completed on September 6, 1941, and the accumulated mileage since then was 2,464 miles.

Track Data

Measurements of the track taken throughout a distance of 275 feet immediately south of the point of derailment were as follows:

<u>Distance south of point of accident</u>	<u>Superelevation</u>	<u>Gage at rail joints shown</u>
<u>Feet</u>	<u>Inches</u>	
275	3-1/2	
259	3-1/2	
242	3-1/2	4 feet 8-1/2 inches
226	3-3/8	
209	3-3/8	
193	3-3/8	
176	3-3/8	
160	3-1/2	
143	3-1/2	4 feet 8-7/8 inches
127	3	
110	3	
94	2-3/4	
77	3-3/8	
61	3-1/2	
44	3-1/2	4 feet 9 inches
28	3-5/8	
11	3-5/8	
Point of Derailment	3-1/2	*4 feet 8-1/2 inches

*Derailment occurred at a point 1-1/2 feet north of rail joint.

Discussion

The engine became derailed to the left when the train was moving at a speed of 25 miles per hour on a curve to the right. The maximum authorized speed for this train was 25 miles per hour. The specified curvature was 4 degrees and the superelevation was about 3-1/2 inches. The fireman, who was the only surviving member of the crew on the engine, felt the engine sway and observed that the engine truck was derailed. He called a warning to the engineer, who made a service brake-pipe reduction and then applied the brakes in emergency. The speed was reduced to about 10 or 15 miles per hour when the engine reached the north abutment of the trestle and overturned. There was no defective condition of the engine and there was no indication of dragging equipment.

After the accident it was found that a section of track 66 feet long on the 4-degree curve to the right was deflected to the east and formed a 12-degree curve to the left. Immediately north of this section, a section of track 125 feet long was deflected to the west and formed a 12-degree curve to the right. At a point 18 feet north of the south end of the second section of displaced track, a wheel-tread mark appeared on the

head of a spike inside the low rail. Opposite this point and throughout a distance of 25 feet northward, the high rail was canted outward and then throughout the next 86 feet it was completely overturned. Apparently the high rail was turned outward and the right engine-truck wheel dropped inside the low rail when the engine truck entered the 12-degree curve to the right and the rear pair of drivers and the trailer truck were on the 12-degree curve to the left. The engine continued forward in a tangential direction and overturned the high rail to the south abutment of the trestle. When the engine moved upon the trestle the derailed engine truck caused the ties to be bunched and the stringers to be damaged. The engine continued on the deck almost to the north end of the trestle and the momentum of the following cars caused the tender and the first car to jack-knife to the right. The right outer guard-rail broke and the engine, the tender and the first car fell to the ground and the general derailment occurred. The substructure of the trestle collapsed during the general derailment.

Because of track curvature and the cut, the engineer's view of the displaced track was restricted to a distance of about 350 feet and the fireman could not see the track. The exact time that the displacement occurred is not known. The last train to pass the point involved was No. 66, a north-bound train, which passed about 8 a.m., or about 5 hours 25 minutes prior to the time the accident occurred. The engineer of this train had been in charge of the engine of a south-bound train which passed over this track the evening of the previous day. At that time he observed that the track appeared to be slightly out of proper alinement at a point about 220 feet south of the point where the accident occurred. He did not consider the irregularity serious enough to be reported. The morning of the day the accident occurred he again observed the irregularity in the track at this location. About 8:30 a.m. when his train arrived at Norwood, about 8 miles north of the point of accident, he made a report of the condition to the section foreman. The section foreman immediately proceeded to the location involved and found three low joints in the track about 220 feet south of the point where the accident occurred. Two joints on the east rail of the curve and one on the west rail were from 1/4-inch to 3/8-inch low. The track was raised to the proper level and the ballast was tamped under the ties. The track was not disturbed at more than 12 ties, all of which were within a distance of about 40 feet. The repairs were completed about 9:30 a.m. Measurements taken by the section foreman disclosed that the superelevation and the gage throughout the length of the curve were in accordance with specifications. The track was out of alinement only about 1/16 inch and the section foreman considered it safe for service. He observed no indication of tight joints or creeping track. During the past 10 months he had been in charge of the track where the

accident occurred and there had been no unusual displacement of the track structure. The track supervisor stated that about 1 year previous to the occurrence of this accident the curve involved was realigned to stake lines and it was necessary to cut some of the rail to align the curve to the specified degree of curvature. In his opinion the work performed on the track several hours prior to the accident did not contribute to the displacement of the track. Prior to the day of the accident he had not observed evidence of the rail creeping. Rail anchors had not been used in this locality; however, he thought rail anchors might have prevented creeping of the track. Other officials of the railroad considered the track structure safe and knew of no measures that could have been taken to prevent the displacement of the track.

The displacement of the track occurred on a 1.1 to 1.3 percent ascending grade northward and on a 4-degree curve. The foot of this grade was 1,685 feet south of the point where the displacement occurred. South of the foot of this grade the track was level a distance of about 3,500 feet, and south of this there was a 1.1 to 1.29 percent ascending grade southward. Since rail anchors were not used and since it was necessary a year prior to the accident to shorten the rail sufficiently to permit the track to be realigned properly, it appears probable that the rail gradually crept down the grade during the past year and caused the rail joints on the lower end of the grade to be compressed. This condition, combined with high temperature, ballast that offered little resistance to lateral movement of the track, and track curvature, resulted in the track being kinked.

Cause

It is found that this accident was caused by kinked track.

Dated at Washington, D.C., this twenty-ninth day of November, 1941.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.