INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY CONCERNING AN ACCIDENT ON THE LOUISVILLE & NASHVILLE RAILROAD AT WOODROW, TENN., ON NOVEMBER 29, 1933.

February 17, 1934

To the Commission:

On November 29, 1933, there was a derailment of a freight train on the Louisville & Nashville Railroad at Woodrow, Tenn., which resulted in the death of 3 trespassers and the injury of 2 employees and 5 trespassers.

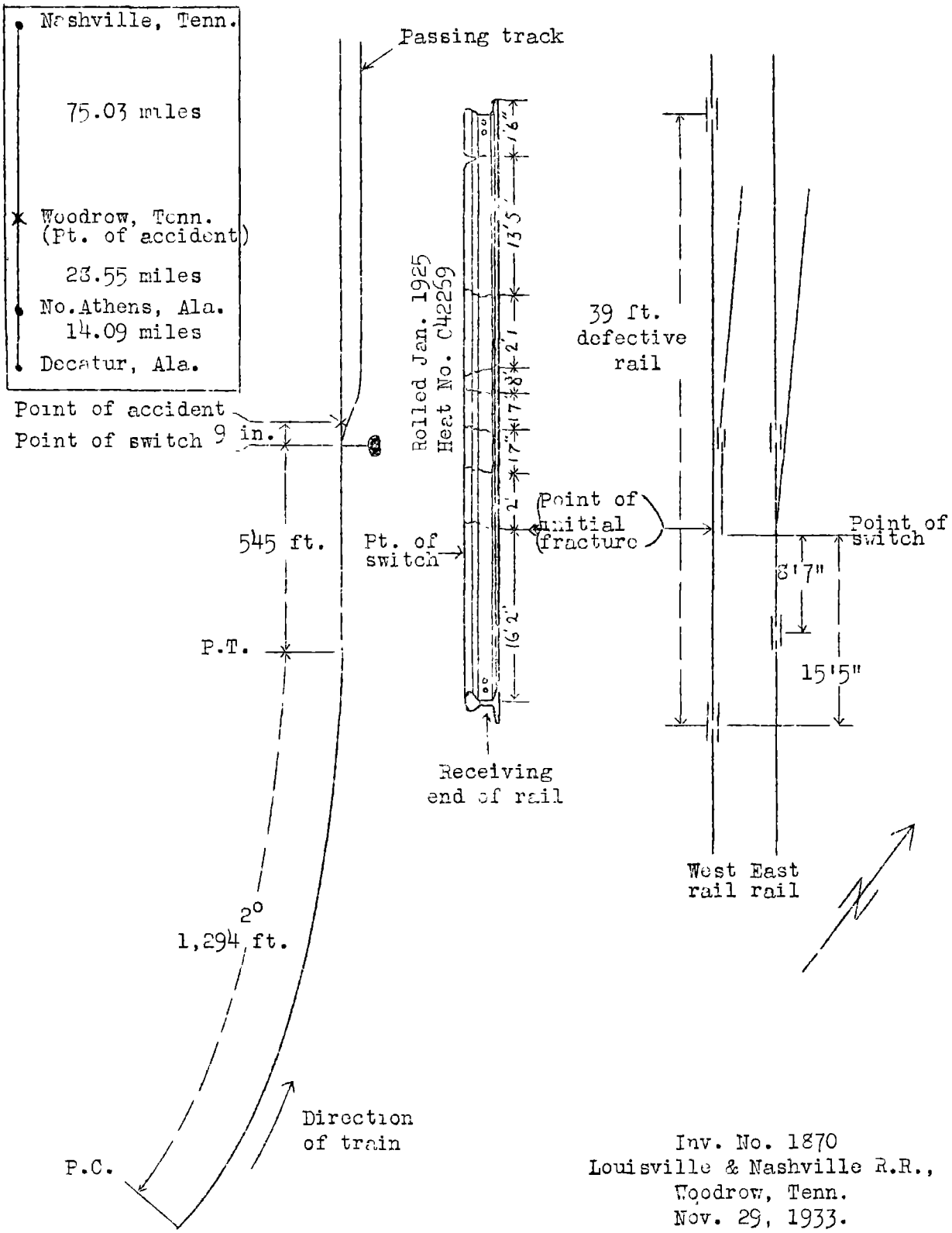
## Location and method of operation

The accident occurred on that part of the Nashville Division extending between Nashville Tenn., and Decatur, Ala., a distance of 117.67 miles; in the immediate vicinity of the point of accident this is a single-track line over which trains are operated by time table and train orders, no block-signal system being in use. The accident occurred opposite the south switch of the passing track at Woodrow; approaching this point from the south, there is a $2^{\circ}$ curve to the left 1,294 feet in length, followed by 545 feet of tangent to the switch, this tangent extending for a considerable distance beyond that point. The grade is slightly undulating, and is 0.18 percent descending for north-bound trains at the switch.

The passing track parallels the main track on the east, the switch being a facing-point switch for north-bound trains and having a no. 10 turnout; the switch stand also is on the east side of the track. Both the main and passing tracks at this point are laid on a fill, ranging from 8 to 12 feet in height.

The track is laid with 100-pound rails, 39 feet in length, with an average of 22 ties to the rail length, single spiked, fully tieplated, and ballasted with gravel and slag to a depth of about 18 inches.

The weather was clear at the time of the accident, which occurred about 9:45 p.m.




Inv. No. 1870
Louisville & Nashville R.R.,
Woodrow, Tenn.
Nov. 29, 1933.

## Description

North-bound second-class freight train No. 74 consisted of 58 cars and a caboose, hauled by engine 1852, of the 2-8-2 type, and was in charge of Conductor Finley and Engineman Kidd. This train left North Athens, 28.55 miles south of Woodrow, at 8.49 p.m., according to the train sheet, 8 hours and 39 miles late, and was derailed opposite the south switch of the passing track at Woodrow while traveling at a speed estimated to have been about 30 or 35 miles per hour.

The engine, tender and first car were not derailed, but the second to the twenty-fifth cars, inclusive, as well as the forward truck of the twenty-sixth car, were derailed to the west. The second car stopped at a point 567 feet north of the switch, bottom up; 21 cars were piled up in a distance of 294 feet north of the switch, while the 3 other derailed cars stopped within a distance of 273 feet north of this point. The employees injured were the conductor and flagman.

## Summary of evidence

Engineman Kidd stated that as the engine passed over the switch at a speed of about 30 or 35 miles per hour he heard an unusual noise and then the engine began to rock, but immediately thereafter it righted itself and the air brakes applied in emergency before he had a chance to take any action. He looked back and saw the cars in the train being derailed; he placed the brake valve in release position and kept working steam so as to keep the engine and first car in the train clear of the derailed cars. After the accident he found the switch lined and locked for the main track and displaying a green indication. Further examination of the track disclosed that a piece of the west or main-track rail was broken out near the switch point; it was about 24 inches in length and the head was crystallized in places at both ends and also in the end of the piece of rail that remained in the track. In his opinion the rail broke under south-bound first-class Train No. 99, which was the last train to pass over the switch, about 3 hours before the accident occurred; he thought that the rail did not give way completely under that train, but that when his own train passed over it north-bound, it broke out a piece of the rail, which was battered on the end, and thereby precipitated the derailment.

At the time of the accident Conductor Finley and Flagman Zuederhoek were riding in the cupola of the caboose; they estimated the speed to have been about 35 miles per hour. Flagman Zuederhoek immediately went back to flag. Conductor Finley went forward and found the switch lined and locked for the main track; in his opinion the accident was caused by the broken rail. The engine

crew of Train No. 99 said they noticed nothing unusual when passing this switch about 3 hours prior to the accident at a speed of 50 or 55 miles per hour.

Section Foreman Holland arrived at the scene of the accident about 1½ hours after its occurrence, and on examining the switch he found that the west switch point was broken near the middle; it was in place, however, and he thought that it was broken as a result of the derailment. South of the switch the track was gauged and found to be in good condition, and there was no indication of dragging equipment. The west rail opposite the switch point was broken in several places; the breaks were new and they showed the presence of transverse fissures. Section Foreman Holland was of the opinion that the rail broke under Engineman Kidd's engine.

Track Supervisor Adams arrived at the scene of the accident about 1¾ hours after its occurrence and found the switch in the condition described by the section foreman. The west rail was torn out of the track and broken into 8 pieces, the first break occurring at a point about 10 inches north of the tip of the switch point; the piece of rail that remained in the track at the receiving end of the rail was in place and bolted to the rail south of it. Examination of the broken pieces of rail disclosed transverse fissures, and in his opinion the rail broke under the engine of Train No. 74 due to the presence of these fissures. Track Supervisor Adams stated that according to his records this section of track was last checked for defective rails by a detector car of the Sperry Rail Service Corporation on November 20, 1933; he followed the detector car on a motor car and it was his duty to replace any defective rails found when instructed to do so by the representative of the railroad who was on the detector car, but his attention was not brought to any defective rails in the immediate vicinity of Woodrow on either of the two trips made by the detector car in the fall of 1933 and he did not replace any rails. He further stated that sometimes oil was used for rail-marking purposes by the detector car and that at other times a white spray was used; the broken rail involved was located at the switch and had ordinary black oil stains on it, and he said that white spray would not show up on the rail for this reason, as it would soon fade out. He examined the rail closely after it was broken and saw what might or might not have been white spray markings on the base of the rail about 3 feet south of the first break, very dim and covered with grease.

Division Engineer Hestle inspected the first three derailed cars and found the brake rigging and flanges in good condition; he also examined as best he could the trucks of several others that were piled up and all seemed to be in good condition. His examination of the broken rail showed that all of the breaks were fresh, and they showed transverse fissures varying in size from 5 to 75 percent of the area of the head of the rail. The

fragments were battered on their south ends, indicating they were broken off by a northbound train and Division Engineer Hestle was of the opinion that the rail broke under the engine of Train No. 74 due to the presence of these fissures. Division Engineer Hestle further stated that detector car 114 of the Sperry Rail Service Corporation was operated over this particular section of track on September 14, 1933, and again on November 20, 1933. As a result of the September inspection 12 defective rails were discovered and on breaking up these rails all of them showed the presence of transverse fissures; none of these rails was in the vicinity of Woodrow, however, and the recording chart for this trip did not show any readings to indicate anything except surface conditions on the rail at the particular location of the rail involved. Division Engineer Hestle said that the results of operating the detector car at this particular time and place were not satisfactory and the same car and crew made a second test over this track on November 20. The operator of the detector car and a representative of the railroad who accompanied the car made a report of the track inspection, but no report was made of defective rails. Division Engineer Hestle noticed the faint white marking on the broken rail, referred to by the track supervisor, and thought that it was made by the detector car on September 14, but he did not find any marking which he thought could have been made on the trip of November 20. It also appeared from the division engineer's statements that when transverse fissures have developed in two rails from any one heat, anywhere on the system, all rails from that heat are removed from the high sides of curves, and when there have been four such failures, all rails from that heat are removed from service. There had been two previous failures from the heat to which the broken rail belonged and he, therefore, had removed one rail from the high side of a curve, this having been done in May, 1930.

The rail that failed was in the west rail of the main track; it was a 100-pound, 39-foot rail, rolled in January, 1925, by the Tennessee Coal and Iron Co., heat C-42269. The rail was broken into 8 pieces, the first break occurring at a point 16 feet 2 inches north of the south or receiving end of the rail, this point being 9 inches north of the point of switch; the 16-foot 2-inch receiving section of broken rail remained in place in the track, bolted to the next rail south thereof; northward from this section the broken pieces measured along the outside of the base of the rail as follows: 2 feet; 1 foot 7 inches; 1 foot 7 inches; 8 inches; 2 feet 1 inch; 13 feet 5 inches; 1 foot 6 inches. All of the breaks were fresh and the first six showed transverse fissures of varying sizes, the maximum covering 60 and 70 percent of the area of the head of the rail and occurring respectively at the first and second breaks; these transverse fissures extended almost to the running surface on the gauge side of the head; the last fracture indicated a pipe or segregation running down through the web.

## Conclusions

This accident was caused by a broken rail, due to transverse fissures.

Examination of the track after the accident disclosed that the rail had been broken into several pieces, six of the fractures being due to the presence of transverse fissures. The largest of these fissures, at the points where the first and second breaks occurred, covered 60 percent or more of the area of the head and extended close to the running surface on the gauge side; in addition to these six fissures, at the last break near the north or leaving end of the rail there was a defect with indications of segregation extending down into the upper portion of the web. The indications were that the rail broke under the engine of the derailed train.

On September 14 and November 20 a detector car of the Sperry Rail Service Corporation was operated over this track, and in view of the fact that the rail causing this accident failed only 9 days subsequent to the second trip made by the detector car, the matter was taken up with General Manager Smith of the Louisville & Nashville Railroad, who advised that the trip made in September was considered unsatisfactory for the reason that the current through the rail was not kept up to required minimum, this being attributed mainly to an oxidized condition of the surface of the rail; it then was decided to make a second test, which was made without current trouble, and the charts covering these two tests were practically identical so far as the south switch at Woodrow was concerned. It appeared that there were seven shelly spots or shallow horizontal fissures in the rail which failed under Train No. 74; that three of the transverse fissures probably were too small to be detected due to the adjustment of the detector apparatus on the car, and that at least one of the others coincided exactly with the location of a rail brace. The two other fissures apparently gave indications on the chart or tape which the operators of the car might have identified had not a correct interpretation of the chart been interfered with by the indications also made on the chart by the seven shelly spots and also by the rail braces and blocks.

There were therefore three conditions in the track at this point which gave identical indications on the recording chart of the detector car, namely rail braces, horizontal fissures or shelly spots which were merely surface conditions and unimportant so far as safety of the track was concerned, and transverse fissures. Subsequent examination of the charts disclosed that all of these conditions were indicated by the car; however, the operators, knowing that rail braces and surface defects were present, attributed all of the chart indications to those two causes and failed to discover that transverse fissures also were

indicated. The record shows that as a result of operation of the detector car over this portion of the L. & N. railroad a number of rails containing transverse fissures were discovered and removed from the track but for the reasons stated the defective rail which resulted in this accident was not reported. The circumstances surrounding this accident point to the need for more careful examination of detector car charts covering rails at switches and for more thorough checking of rails at these locations.

Respectfully submitted,

W. P. BORLAND

Director.