

INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE
INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE
CINCINNATI, NEW ORLEANS & TEXAS PACIFIC RAILWAY
SOUTHERN RAILWAY SYSTEM, NEAR HELENWOOD TENN.,
ON JANUARY 24, 1931.

February 25, 1931

To the Commission:

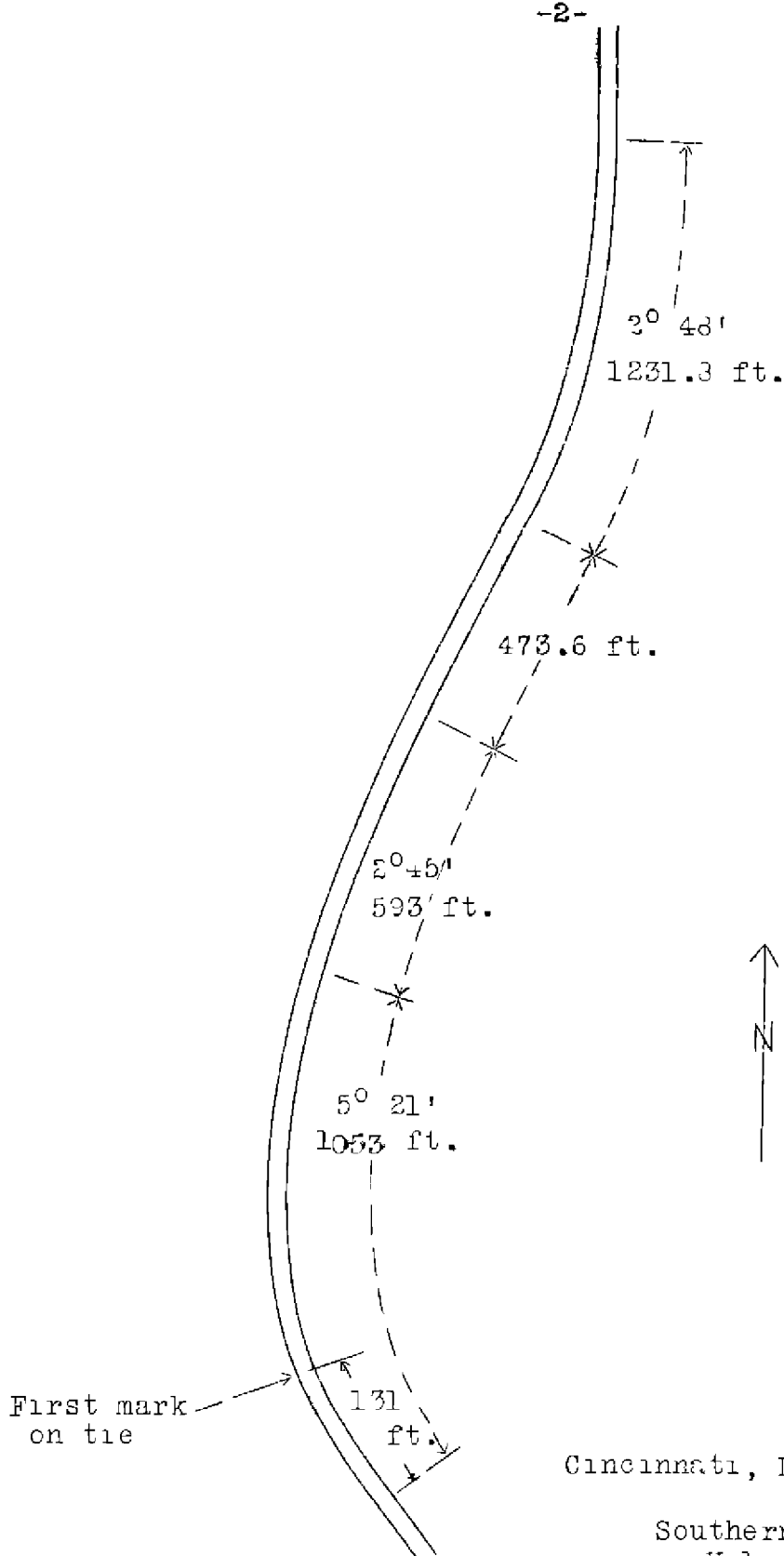
On January 24, 1931, there was a derailment of a passenger train on the Cincinnati, New Orleans & Texas Pacific Railway, Southern Railway System, near Helenwood, Tenn., which resulted in the death of 3 passengers and 2 employees, and the injury of 10 passengers.

Location and method of operation

This accident occurred on the Queen & Crescent District, extending between Donville, Ky., and Oakdale, Tenn., a distance of 137.9 miles, in the vicinity of the point of accident this is a double-track line over which trains are operated by time-table, train orders, and an automatic block-signal and train-control system. The accident occurred at a point 3.097 feet south of the station at Helenwood, approaching this point from the north, there is a $2^{\circ} 48'$ curve to the right 1,231.8 feet in length, from which point the track is tangent for a distance of 473.6 feet, followed by a compound curve to the left 1,646 feet in length with a maximum curvature of $5^{\circ} 21'$ the accident occurring on the easement of the last-mentioned curve at a point 131 feet from its leaving end. The grade for southbound trains is 1.137 per cent descending for a distance of 4,133 feet preceding the point of accident.

The track is laid with 100-pound rails, 39 feet in length, with an average of 24 ties and 6 rail anchors to the rail-length, fully tie-plated, and is ballasted with limestone to a depth of from 12 to 15 inches, the track is well maintained.

The weather was clear at the time of the accident, which occurred between 12.48 and 12.58 p.m.



Inv. 1685
Cincinnati, New Orleans & Texas
Pacific Ry.,
Southern Railway System
Helenwood, Tenn.
Jan. 24, 1931.

Description

Southbound passenger train No. 5 consisted of one combination baggage and coach, one coach, one dining car, and six Pullman sleeping cars, all of steel construction except the dining car, which was of steel-underframe construction, hauled by engine 6477, and was in charge of Conductor Huskins and Engineman Lindle. This train passed Pine Knot, the last open office, 18.5 miles north of Helenwood, at 12.32 p.m., four minutes late on its wait order and after passing Helenwood it was derailed while traveling, at a speed estimated to have been between 50 and 55 miles per hour.

The engine and tender were derailed to the right and came to rest against an embankment, leaning at an angle of about 45°, with the forward end of the engine 279 feet south of the initial point of derailment. All of the cars in the train were derailed, but they remained on the roadbed practically in line with the track. The first and second cars continued beyond the engine for a distance of 956 feet, the first car was upright but the second car was on its left side and apparently had skidded the entire distance in that position. The third to seventh cars, inclusive, were partly overturned while the two rear cars remained upright, the third car stopped about 350 feet beyond the engine and the rear car was about at the initial point of derailment. The engine and first seven cars were badly damaged and the eighth and ninth cars were slightly damaged. The employees killed were the engineman and fireman.

Summary of evidence

Conductor Huskins stated that the crew took charge of the train at Somerset, 55 miles north of Helenwood, and that the brakes were tested before departing from that point and reported to be in good condition by the inspector. The only place that speed was reduced after leaving that point was at a bridge located about 7 miles from Somerset, and he noticed no unusual motion of the train before passing Helenwood. Shortly afterwards, however, he felt an application of the brakes, followed two or three seconds later by the derailment of the train, he estimated the speed of the train at the time of the accident at 50 or 55 miles per hour, and said that when the car in which he was riding, the first car behind the engine, came to rest, and as soon as he was able to get out of it, he noted the time, which was then 12.58 p.m. He made no inspection of the equipment or track after the accident and was unable to state any reason for its occurrence. Conductor

Huskins also said that the engineman appeared to be in normal condition before leaving Somerset, that he had known the engineman for several years, and considered him a competent engineman. It also appeared from the conductor's statements that they were close to the time shown on their wait order, were making about the usual speed, and probably would be right on the time of the order by the time they reached Oakdale, 39.3 miles south of Helenwood.

Baggageman Brown stated that at the time the brakes were applied to reduce speed in crossing the bridge south of Somerset, they seemed to function properly and there was nothing about the handling of the train that attracted his attention. He was riding in the first car and his first knowledge of anything wrong was when the car derailed, he having felt no brake application prior to that time, he thought the speed of the train was about 50 or 55 miles per hour at the time of the accident. After the car stopped he went ahead to flag, without having noted the time, and made no inspection to ascertain the cause of the accident. Before getting out of the car, however, he heard the conductor say what time it was, but did not know whether the time mentioned was 12.48 or 12.58 p.m.

Flagman Sharp stated that he rode in the rear car from the time the train left Somerset and did not notice anything unusual about its operation prior to the time of the accident, there being no indication of excessive speed at any time. He said speed was materially reduced at the time the brakes were applied in crossing the bridge south of Somerset, and that the train then continued to run smoothly until it suddenly seemed to slacken speed and then began to surge, but he did not know whether this was due to an emergency application of the brakes or as a result of the derailment. According to his judgment, the train was traveling at a speed of between 50 and 55 miles per hour at the time of the accident. In his haste to get back to Helenwood and report the accident, he failed to notice what time the accident occurred. He did not discover any indications of broken equipment while returning to his train, although some time after the accident he again went back and noticed bright marks on the outside edge of the west rail about three car-lengths to the rear of the train, these marks looked as though they might have been caused by a wheel, but there was no indication of a wheel having climbed the rail.

The statements of Train Porter Wellington were to the effect that he was riding in the first car of the train, and his first knowledge of anything wrong was

when he heard a slight noise and upon looking ahead he observed that the engine had separated from the train. He did not consider himself a judge of speed but thought the train was traveling between 50 and 55 miles per hour at the time it was derailed, which he said was the ordinary speed.

Section Foreman Judd, on whose section the accident occurred, stated that he was working in the vicinity of the station at Helenwood when train No. 5 passed, traveling at the usual rate of speed, about 55 miles per hour. About one or two minutes later he heard a noise toward the south which resembled escaping steam and the drivers of an engine slipping on the rails. The automatic signals did not clear, and as soon as he saw a flagman approaching from that direction he immediately proceeded to the point of accident and rendered assistance. As soon as this task was completed he made an inspection of the track and found that the curve north of the point of accident did not appear to have been knocked out of line. He then looked for marks on the rails and noticed a heavy mark on the outer edge of the ball of a rail on the outside of the curve, which extended about three and one-half car-lengths to where the last car came to rest, this mark appeared to have been caused by pressure. He also noticed that rust had been broken from the outside of the web of the west rail in several places, extending northward about 15 or 20 rail-lengths from the rear of the train. The last work performed on this curve was on January 21 and consisted of leveling the track in two places, the balance of the curve being in good condition; the track was patrolled on January 22 and 23, but was not scheduled to be patrolled on the day of the accident until afternoon.

Agent Whisenhunt, on duty at Helenwood, stated that he had just returned from lunch when he heard the station whistle-signal sounded by train No. 5 as it was approaching that point, which was at 12.40 or 12.45 p.m. He was standing on the station platform at the time the train passed, traveling at the ordinary speed, he noticed no unusual motion of the train and did not see anything dragging. The engine man was sitting in the cab, with his eyes open, and appeared to be in normal condition. Agent Whisenhunt heard the hiss of escaping steam a short time later, and as soon as the flagman returned to the station and informed him of the accident, he reported the matter to the dispatcher.

Roadmaster Self stated that he arrived at the scene of the accident about 3 p.m. on the day of its occurrence and made an examination of the track, the first marks appeared on the ties near the rear truck of the last car and apparently were caused by the derailment of this truck. Being advised by the section foreman of the mark on the ball of the west rail north of that point, he examined this mark, which appeared on the outside edge of the rail and extended about three and one-half car-lengths from the rear of the last car. He was unable to determine what caused this mark, but it did not appear to be a flange mark, as the metal was not dented, but instead it looked as though something had scraped the surface of the rail, making a mark about one-fourth inch wide. His attention was also called to the rust being broken from the web on the outside of the west rail, north of the mark just described, and upon examination he found 10 or 12 of these rust-free marks, which were approximately 18 feet apart, indicating that the rails on the outside of the curve had received severe strain, and at that time he thought this condition might have been caused by vertical pounding, due to a stuck wedge. He took no measurements of the track at the time of this inspection, but from observations he was unable to find any sign of surface or line kinks on the curve, and he considered the track safe for the maximum permissible speed. On the following day he examined the track north of the point of accident and there were no unusual conditions existing at that time, but on January 29 a further inspection disclosed that line kinks had formed in 10 of the rails on the outside of the curve where the rust-free spots were found, making it necessary to remove these rails from the track. He was of the opinion that these kinks developed as a result of the rails being damaged by side thrusts of the engine of train No. 5 as it passed over this portion of the track on the day of the accident, possibly the back driver or the trailer-truck wheel being the cause, the trailer truck frame and radius bar having been found broken after the accident. The track was gauged again on January 29 and it was found that the gauge was wider opposite the rust-free spots than elsewhere.

Supervisor Barron stated that upon his arrival at the scene of accident on the day it occurred, his attention was called to the mark on the rail on the outside of the curve, as well as the marks where the rust had scaled from the webs of the rails on the same side of the curve. On the following day he made a general inspection of the track for a distance of about 2 miles north of the point of accident, but did not find any

other marks on the rails except those already described. The first mark found on the ties was at a rail joint on the easement of the curve where the elevation was $3\frac{1}{2}$ inches. Measurements of the track were made, beginning at the point of derailment and extending northward for a distance of 20 rail-lengths, which showed the super-elevation to be uniform, with a maximum of 6 inches, the gauge did not vary more than one-half inch, and there were no low joints perceptible. He found nothing about the condition of the track that could have contributed to the cause of the accident, and in his opinion it was perfectly safe for maximum speed. He accompanied Roadmaster Self to Helenwood on January 29 for the purpose of making another inspection and it was then discovered that several slight lateral kinks appeared in the rails on the outside of the curve, where the rust-free marks were found on the day of the accident, he thought these were due to the track having been damaged by train No. 5 and that these kinks subsequently formed, after traffic was resumed, to the extent that they could be discerned by observation. It was his opinion that the right radius bar broke, resulting in the truck as a whole not tracking properly, that this was noticed by the engineer, who applied the brakes, causing such a strain as to break the frame.

Engineer Maintenance of Way Hayes stated that he arrived at the point of accident at 6.45 p.m., and with the aid of a flashlight he examined the rails and ties in the immediate vicinity for marks which would indicate the initial point of derailment. He did not find any flange marks between the rails except those made by the two rear cars when they were pulled northward during the course of rerailing them. The first marked tie was at a joint in the west rail where the rear of the last car stopped following the derailment. This tie showed a scar on its extreme western end and the succeeding ties southward were scarred progressively to a greater extent, but he was unable to state definitely how these marks were made, although it was possible they were caused by wheel flanges. He found no indication on the ties of anything having been dragging, and from the appearance of the mark on the ball of the west rail, north of where the cars stopped, he thought it could not have been made by anything bearing heavily against the rail. He described this mark as being from one-fourth to three-eighths of an inch wide, visible for a distance of three or four rail-lengths, and it seemed to be merely a disturbance of the rust that naturally accumulates on the rail head. He also looked at the spots on the web of the

west rail, some of which were rather difficult to see, and he did not know at the time whether they were of any significance. He made a further examination of the track northward from the point of accident and found it to be in good condition, there being no kinks either in line or surface that he could observe. He returned to the scene of accident on January 30 and examined 9 or 10 rails that had been removed from the west side of the southbound track, north of the point of derailment. One of these rails had been cut in two sections, and he therefore did not examine this rail. The remaining rails showed line or lateral kinks over or within about 1 foot of crayon marks previously made at the rust-free spots; in addition to these kinks, he also found four other kinks that did not occur at rust-free marks, and it appeared to him that these spots and kinks were caused by blows or an excessive pressure applied to the rails on the outside of the curve. It was Mr. Hayes' idea that the breaking of the right radius bar contributed to the accident, and from the statements of witnesses he did not think that speed alone kinked the rails or broke the radius bar.

Assistant Superintendent Higgins, who said that the accident was reported to him as having occurred at 12.53 p.m., reached the scene at 4.45 p.m., and after having seen the various marks on the track, he reached the conclusion that the accident was due to a stuck wedge, followed by a heavy application of the air brakes, lifting the back drivers off the track.

Engine Inspector Kiser stated that he inspected engine 6477 prior to its departure from Somerset on the trip on which the accident occurred. This inspection consisted of going over the engine thoroughly, and the only exceptions he noticed were that the left ^{front} wedge bolt was loose, the right front equalizer bushing had worked out slightly, the bolts were loose on the left front binder, and the left trailer spring had slipped in its band. All of these defects were noted in his inspection report but he did not know whether repairs were made before the engine departed. He tapped all of the wedges with a hammer and none of them was stuck. He also crawled under the engine and examined the brake-rigging, springs, equalizer pins, and trailer, and checked the lateral as well as the flanges of the wheels, which he found to be in good condition. He also went under and around the tender and made a similar inspection.

Machinist Burton stated that he made all of the repairs to engine 6477 that were listed on the report signed by Inspector Kiser, and in addition he set up the wedge on the left main rod which had been reported as pounding badly by the engineer in charge of this engine on its incoming trip. He did not examine the engine for any other defects. Roundhouse Foreman Raburn stated that he inspected engine 6477 after the repairs had been made at Somerset and observed that all of the defects had been repaired; he considered the engine in first-class condition.

Car Inspector Spears stated that he inspected and tested the brakes on train No. 5 before it departed from Somerset, found them to be working properly, and notified the conductor to this effect. He also noticed that a running test of the brakes was made while the train was leaving the yard. Air Inspector Hicks stated that he tested the air brakes on the engine at Somerset and found them to be in proper working order.

Master Mechanic Trexler stated that he arrived at the scene of accident at 3.40 p.m. and at once inspected the engine, which was in a badly-damaged condition. He crawled under the engine and examined as much of the running gear as possible, but was unable to find anything that could have contributed to the accident. In describing the damage, he said the engine truck was found 535 feet south of where the engine came to rest, with its back cross brace broken, the female casting was 352 feet south of the engine, one rocker arm of this truck was under the left cylinder, and the safety chains were broken loose. The left bottom guide and part of the guide yoke extension were broken off, the right front corner of the pilot beam was broken off, the right cylinder broken, the front end of the boiler crushed, and the right side of the boiler was stripped, including that side of the cab, part of the cab being 150 feet back from where the engine stopped. The trailer truck frame bolts at the left radius bar connection were sheared off just in front of the journal box, these being new cuts; the trailer frame was broken near the centering device, and the right side of the radius bar was broken through the back bolt holes at the front where it was bolted to the radius bar end; these fractures were also new. The balance of the running gear remained intact and in good condition, as was also the case with the tender trucks. A further inspection was made of the engine when it arrived at the shop subsequent to the accident, and it was found that all of the wedges were in proper place and set up properly, with their bolts and nuts tight. He further stated that had the trailer-truck radius bar broken before the train derailed, the rear end of the engine would have a tendency to lurch laterally, which

might have caused the marks on the web of the west rail and finally caused the derailment, although under these circumstances he had no idea how the engine wheels could have moved across the west rail without making a mark of some kind.

An examination of the track by the Commission's inspectors disclosed there were no flange marks on the rails or between the ties at the point of derailment. At a point 565 feet north of the point of accident there were faint signs of rust having been scaled from the outside of the web of the west rail, these marks being scattered over an area of 5 inches in width and extending from the base to the outside edge of the ball. Eleven other rust-free spots were found south of that point, ranging from 15 to 156 feet apart, the last spot being 146 feet north of where the first mark of derailment was found. Beginning at a point 156 feet north of this latter mark, there was a slight mark on the outer edge of the ball of the west rail which extended continuously to where the marks on the ends of the ties appeared, this mark on the rail did not break entirely through the rust accumulation and showed no signs of heat having been generated by friction. The first mark of derailment was a mark on the outer edge of a tie on the west side of the track, and similar marks appeared on the next six ties, with increasing depth. The following 16 ties had their ends split off and from this point southward the track was destroyed. The marks on the first seven ties had the appearance of having been shaved by some object, rather than caused by wheels or flanges. At a point 60 feet south of the first mark on the ties an engine rerailer and a sill step from the right side of the tender were located, and a little farther southward the right side and a part of the top of the engine cab was found. At this point the rocks on the west side of the track are approximately $2\frac{1}{2}$ or 3 feet high and the earth embankment above these rocks slopes westward and continues to rise in height towards the south. Marks were found on these rocks from the point where parts of the cab were located to where the engine finally came to rest.

Engine 6477 is of the 4-6-2 type, with a driving wheel base of 13 feet, and a total wheel base of 36 feet 1 inch. This engine was released from the shops on January 19, 1931, after having received Class 4 repairs. Examination of the engine showed conditions about as described by the various witnesses, and consideration of the construction of the trailer truck, weight distribution, etc., in view of the damage sustained, led to the conclusion that this damage did not result from any motion, lateral or vertical, and however violent, that could have developed prior to derailment of the engine.

Conclusions

This accident probably was caused by excessive speed.

According to the statements of the surviving members of the crew, at the time of the accident the train was traveling between 50 and 55 miles per hour. Conductor Huskins stated that he felt an application of the brakes about two or three seconds before the occurrence of the accident but the other members of the crew noticed no such application and their first knowledge of anything wrong was when the train derailed. An examination of the track north of the point of accident disclosed that rust had been broken off on the outside of the webs of the west rails in several places, followed by a light scar or mark on the outer edge of the ball of the rails on the same side of the track, which mark extended to where the first marks appeared on the ties, the latter marks being on the ends of the ties on the outside of the curve, but not in the nature of flange marks. There were no flange marks on the rails or on the ties between the rails, and judging from parts of the cab found a short distance south of the marks on the ties, as well as marks on the rocks on the west side of the track, it appeared that the engine overturned cleanly and then partly righted itself as it slid along the slope of the embankment.

On account of uncertainty as to the exact time of the accident, it is impossible to say definitely at what average speed the train had been operated between the last open office and the point of accident, a distance of 19.7 miles. The condition of the equipment after the accident, however, coupled with the manner in which it came to rest, the nature of the damage sustained, and the absence of flange marks at the point where the derailment is believed to have occurred, indicate quite clearly that the estimates as to speed made by the surviving members of the crew must be considered as minimum estimates. In all probability the speed was in excess of 60 miles per hour, and it would appear that this high rate of speed resulted in the overturning of the engine and that the principal damage to the trailer truck was caused by the first two cars as they passed the derailed engine, these cars also causing other damage to the left side of the engine, such as the guide, guide-yoke extension, and back end of the left cylinder.

The theory was advanced that the trailer radius bar failed prior to the accident, causing an undue pressure against the outside rail of the curve, thus accounting for the kinks which developed afterwards and made it necessary to remove 10 rails from the track; It was also suggested that this condition could have resulted from a stuck wedge, and that either one or the other of these factors might have been responsible for the derailment of the train. Subsequent inspection failed to develop anything wrong with the wedges, and while it is possible a broken radius bar contributed to the accident, it is believed that high speed was the principal factor.

The employees involved were experienced men and at the time of the accident none of them had been on duty in violation of any of the provisions of the hours of service law.

Respectfully submitted,

W. P. BORLAND,

Director.