

IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE
TENNESSEE CENTRAL RAILROAD NEAR OBER CITY, TENN.,
OCTOBER 30, 1919.

December 20, 1919.

On October 30, 1919, there was a derailment of a freight train on the Tennessee Central Railroad near Ober City, Tenn., which resulted in the death of two employees. After investigation of this accident the Chief of the Bureau of Safety reports as follows:

The Crawford Branch of the Eastern Division of the Tennessee Central Railroad extends between Monterey, Tenn., and Davidson, Tenn., a distance of 21.3 miles. It is a single-track line, over which trains are operated by means of time-table and train orders. Approaching the point of derailment from the east there is a tangent of 1,167 feet, terminating just west of the west switch at what was formerly known as Lovejoy, followed by a 10 degree curve to the right 614 feet long. This curve extends for a distance of 105 feet upon Bridge 7.83, a wooden trestle bridge 593 feet in length and 57 feet high at its highest point. The derailment occurred on the curve, at a point about three rail lengths east of the bridge. The grade is descending for a distance of over two miles, the mile immediately preceding the point of derailment having a maximum of 3.3% and a minimum of 1.5 % extending to within a few feet of the east end of the bridge; it is then .16% descending to a point about half-way across the bridge from which point it is level for a short distance.

Bridge 7.83 consists of 37 bents between abutments, ranging from 1 to 3 panels, resting on mud blocking. The bridge is of

good design and construction and well maintained. The track is laid with 60-pound rails, 30 feet in length, single-spiked, with an average of 17 oak ties to the rail. In general it is tie-plated on curves, with a few rail braces, and is ballasted with slag. Considering that it is a branch line, the maintenance is fair, except that on the curve where the derailment occurred the outer rails were badly curve worn. It was raining at the time of the accident.

The derailed train was being operated as a work extra, consisting of 20 cars of coal and a caboose, hauled by engines 16 and 32, and was in charge of Conductor McDonald and Enginemen Haley and Collins. At the time of the accident it was en route westbound from Highland Junction to Monterey. It departed from Highland Junction at about 2.00 a.m. with 10 loaded coal cars, and at Crawford, 5.2 miles west of Highland Junction, 10 additional cars were picked up. The train then proceeded to Green Pond, a distance of 4.9 miles, where a stop was made in conformity with time-table rule No. 24, which provides for the turning up of retainers before beginning the descent of the grade which begins at that point. The train next stopped at Lovejoy, 2.2 miles from Green Pond, and about 1,000 feet east of the point where it was derailed, for the purpose of turning down the retainers. Leaving Lovejoy, the train was permitted to drift on the descending grade toward bridge 7.33, and at about 4.14 a.m., while moving at a speed estimated at from 12 to 15 miles an hour, the front pair of driving wheels of engine 32 were derailed on the curve approaching

the bridge. The train proceeded with drivers derailed until about half-way across the bridge, when all the wheels of the engine and tender excepting the engine truck dropped off the rails upon the ties. The train then parted and both engines, remaining coupled together, continued safely across the bridge and came to a stop a few feet beyond its western end with only slight damage to engine 32; engine 16, the lead engine, was not derailed. The first two cars fell from the bridge on the left side at a point about 90 feet from its western end, between the 5th and 6th bents, tearing down the 4th, 5th, and 6th bents and two pedestals of the 7th bent, but leaving the girders intact with the ties bunched and rails broken. The 11 following cars fell from the bridge at a point about 175 feet from its western end at the 10th, 11th, 12th and 13th bents, the entire structure of these four bents being carried down with the falling cars. The 14th car came to rest projecting partially over the gap, the bottom of the car resting upon the bridge and the rear end jammed against the next car. The 6 rear cars and caboose of the train remained on the bridge, the rear end coming to a stop on the bridge about 140 feet from its eastern end. The employees killed were two brakemen, who were riding on cars in the middle of the train.

At the investigation of this accident it developed that at about 4.45 p.m., October 29, the afternoon prior to the derailment of the work extra, as engine 32 was hauling eastbound passenger train No. 24, the leading driving wheels of the engine were de-

railed on the curve within a few feet of the point where the same engine was derailed at the time of the accident here under consideration. The engine was stopped within its own length, the driving wheels were rerailed, and the train proceeded after only a slight delay. Conductor Smith and Engineman Fidler, who were in charge of train No. 24, at the time made no report of the derailment until after the derailment of the work extra giving as their reason that in their judgment there was no defect or damage to track or equipment.

Conductor Smith, of train No. 24, in his statement concerning the derailment of engine 32 of this train, said that when his train was on the curve east of bridge 7.33 his attention was attracted by an emergency application of the brakes and upon investigating, he found the lead pair of driving wheels had been derailed. He and Engineman Fidler inspected the track and found where a wheel had mounted a rail, this being at about the middle of the rail. The flange marks extended about 12 or 15 feet along the head of the rail before the wheel dropped off. They continued their inspection of the track beyond this point and he stated that, while their inspection was made without moving the train off that portion of the track where the derailment occurred, they could find no condition indicating that the track was defective, or damaged by the derailment excepting a few broken bolt heads, and were satisfied there was no unsafe condition of the track and that the gauge was not any wider than it had been, although the engineman remarked to him that the gauge looked a little wide and he agreed with him. At Crawford

he met an opposing train and advised its crew of the derailment. He did not notify the section foreman and admitted that he failed to observe the rule requiring telegraphic reports to be made of accidents, saying he felt satisfied that the track was safe. On the return trip he noticed no rough riding over this part of the road.

Engineman Fidler, of train No. 24, stated that his train was running 10 or 12 miles an hour when he felt the forward driving wheels derail. He immediately applied the brakes and brought the train to a stop in about one car length. He examined the engine and track, but could find no condition which indicated the cause of the derailment. On his return trip, however, he reduced the speed of his train at this point. Upon arrival at Monterey he made a notation on his work report to the effect that the engine had been derailed. He had no conversation with the conductor as to making a report, although he was aware that such was the conductor's duty. This was the only trip on which he had had engine 32 and he thought it rode more roughly than some of the other engines.

Fireman Donnell, of train No. 24, stated that he felt the jar as the driver derailed. He could find nothing about the engine to indicate the cause of the derailment.

Inasmuch as the conductor in charge of train No. 24 did not make the required telegraphic report of this accident, no opportunity was afforded for an inspection of the track or equipment between the time of this derailment and the time of the derailment of the work extra, a period of less than 12 hours.

Engineman Haley, of engine 16, the lead engine of the work extra, stated that on leaving Lovejoy he permitted the train to drift. He then made a service application of the brakes and held them applied until his engine was almost on the bridge, when he released the brakes. When about at the middle of the bridge and moving 12 or 15 miles an hour, Engineman Collins whistled for brakes. He at once applied the brakes in emergency, but as there had not been sufficient time to recharge, he did not get a very effective application.

He felt no jerk or lurch as the cars behind him began to fall through the bridge. His engine was still drifting and came to a stop a little beyond the west approach to the bridge. When passing over the track where the derailment occurred, he observed no unusual condition, either on this or the previous trip. In company with Gen. Supt. Stanley, he examined engine 32 after the derailment, but could find no defect which would cause a derailment. He observed the light flange marks on the inside of the rail on the curve east of the bridge. He also stated that he heard some one say something about engine 32 having been derailed, but gave it no thought as he had no slow orders or other advice concerning it.

Engineman Collins, of engine 32, stated that he did not use any steam leaving Lovejoy. When his engine had gone about 10 feet upon the trestle, he felt a jumping motion, and saw that the front drivers were derailed. He sounded the whistle for brakes and felt them applied, but could not say whether

or not it was an emergency application. The engine was about half way across the bridge when all the drivers and the tender wheels were derailed, continuing on the ties to a point about an engine length beyond the western end of the bridge. He thought the track at the point of derailment was in fair condition. He saw where the rails had moved on the ties and was of the opinion that his engine had spread the track at that point and had been derailed at a point about $1\frac{1}{2}$ rail lengths east of the bridge. The wheel marks continued about one-third of the way to the point where the cars fell through the bridge; these marks were very light and indicated that at first only the lead drivers were derailed. He found no defects when he examined the engine after the derailment.

Fireman McDonald, of engine 32, and Fireman Hallum, of engine 16, corroborated the statements of their respective enginemen. Fireman Hallum also stated that for some time he had noticed that the curve where the derailment occurred was somewhat rough and had mentioned it to Track Supervisor Copeland once or twice, the last time being about a month prior to the derailment.

Conductor McDonald, of the work extra, stated that in leaving Lovejoy, after the retainers had been turned down, the train was permitted to drift on the descending grade, neither engine using steam. Before the train had reached the bridge, he felt a service application of the air brakes

followed by their release. His first intimation of anything wrong was when he heard Engineman Collins, of engine 32, whistle for brakes when the engines were about at the middle of the bridge; he then saw fire flying from the engine. At the time the engineman whistled for brakes, the speed was about 15 miles an hour. He later examined the track on the curve and found light flange marks, which indicated to him that a driving wheel had been derailed and led him to the conclusion that the derailment was due to spread track. He had had no advice of the previous derailment of train No. 24 on this curve.

Track Supervisor Copeland stated that he had passed over this part of the road on October 25th on a motor car, at which time it seemed to be in good condition with the exception of the rails being worn. They endeavored to maintain a gauge on the curve of 4 ft. 9 in. and a superelevation of 3 inches. He was aware that the rails were badly flange-worn, as were some of the joints. A number of ties had been distributed on the curve for renewals, and the work was under way, the section foreman having put in some new ties a short time previously. He thought 40 new ties would be sufficient to cover the renewals necessary on the curve. He remembered that Fireman Hallum had called his attention to the roughness of the track and he had directed the track forces to repair it and put it in condition. When he examined it some time later he saw that 12 or 15 new ties had been put in and felt that some improvement had been made in its condition, but had told Fireman Hallum he would

have to have some new rails before he could get it in proper shape. He also stated that there were a number of places where the rails were curve-worn as badly as at this point.

Section Foreman Toney stated that a few hours after the derailment he examined the track and found that the inside rail of the curve had been canted or turned up slightly for a distance of about 3 rail lengths, some of the spikes being pulled up about $1\frac{1}{2}$ inches. He found the gauge correct at the point where the flange marks crossed the rail, but there was one place where the gauge was 4 ft. $9\frac{1}{2}$ inches; this was the widest gauge he found, and was located about half way between the marks showing where the two derailments had started. He said it was necessary to re-spike the rail for about 3 rail lengths. He had passed over this curve the day before the derailment and observed no unusual conditions. He knew that the rails were curve-worn, and it was his opinion that they should be replaced. He had asked for new rails, but they had not been furnished. There were other rails on his section which were as badly curve-worn as the one on this curve. The condition of the ties was only fair, but he had all the ties needed and was putting them in as fast as conditions permitted. He had distributed 33 or 34 ties on the curve preparatory to making necessary renewals and on October 25, had put in 6 new ties and gauged the track. The gauge at this time was satisfactory, but he said that there was an average of 5 new ties needed under each rail. He stated that he was endeavoring to maintain a gauge of 4 ft. 9 in. on the

curve, and while he had been told once or twice to watch the gauge he had not experienced any special difficulty in maintaining it in safe condition. He did not know anything about the derailment of engine 32 on October 29th. His labor allowance was 90 days monthly for his section of seven miles of track, five of which were main line track, and he said that he tried to give regular employment to four men. At the time of this accident he was using five men, endeavoring to make up for time lost during the month.

Engine 32 was of the 2-8-0 type, with a weight on the driving wheels of 128,100 pounds. Examination of the work report made out by Engineman Fidler, in charge at the time train No. 24 was derailed on October 29, showed that in addition to the derailment on the curve near bridge 7.83, the forward driving wheels had also been derailed on the siding at Green Pond.

Road Foreman of Engines Edwards stated that about 4 hours after the derailment he made an examination of engine 32 and upon checking up the lateral he found it within the limits, being not over $5/8$ of an inch at the most. The general condition of the engine was good and he said no work was required to be done on it after the derailment.

Machinist Castleman, employed at Monterey roundhouse, inspected engine 32 at 1.00 p.m. October 30, and his report showed the gauge of the driving wheels to be as follows:

Front, $52\frac{3}{4}$ inches; intermediate, $52-11/16$ inches; main, $52-13/16$ inches; back, $52\frac{1}{2}$ inches, engine trucks, $53\frac{1}{4}$ inches. The measurements for lateral were as follows: Front $7/16$ inch; intermediate, $\frac{1}{2}$ inch; main, $7/16$ inch; back, $9/16$ inch; engine trucks, $5/8$ inch. He stated that he found both front and back wedges adjusted properly. The right front driver had a sharp flange, but it was within the gauge, and further inspection revealed nothing which would cause a derailment.

Master Mechanic Mauk reported that on November 4th, he inspected engine 32 at Monterey and found the gauge of the driving wheels to be as follows; Front, $52\frac{3}{4}$ inches, intermediate, $52-5/8$ inches; main, $52-7/8$ inches; back, $52\frac{3}{4}$ inches; engine trucks, $53\frac{1}{4}$ inches. According to his report, the standard gauge on this road for driving wheels is maintained as follows: Front, $53-1/8$ inches; intermediate, plain tread, main, $53\frac{1}{4}$ inches; back, $53-1/8$ inches; his measurements for lateral were as follows: Front, $\frac{1}{2}$ inch; intermediate, $7/16$ inch; main, $7/16$ inch; back, $3/8$ inch; engine trucks, $11/16$ inch. He reports making a test by taking the engine around the wye at Monterey and while the engine was on the sharpest curve, he measured the bearing surface of the wheel tread on the rail and found it to be $\frac{3}{4}$ of an inch.

An inspection of the track in the vicinity of where both derailments occurred revealed certain characteristics which were common to both derailments. In the case of the derailment of

train No. 24 the flange marks on the outside rail extended about 6 feet before the wheels dropped off on the outside. The indentations followed an even course around the curve, just a few inches distant from the base of the rail. They were very light indentations indicating that only the lead drivers were off the track, in a suspended position, preventing heavier marks and forcing them to follow the curve. The first indication of the derailment of the work extra was the light mark of a flange on top of the outer rail, beginning within 3 feet of where the derailment of train No. 24 began, and extending about 18 inches before dropping off on the outside. On the opposite side of the track were flange marks on the ties and inside base of the rail, these marks indicating that the right driving wheel was derailed before the left driving wheel mounted the rail. The marks made in this derailment also followed an even course around the curve and upon the bridge. These were also very light indentations, barely breaking the fibre of the wood, and indicating that only the lead drivers were derailed in this entire distance. At some subsequent point the other wheels of the engine and tender were derailed, thus causing the damage to the track which resulted in the derailment of the cars and the subsequent wrecking of the bridge.

Inspection of the track also showed that the outer rail was badly curve-worn. At the time of this inspection, the gauge measured up to standard, repairs to the track having been made. Indications of loose gauge were noticeable, particularly at the

points of derailment and adjacent thereto, as evidenced by tie plates which had worked out of their original position and had subsequently been drawn to gauge and spiked. The track was well ballasted and except for the curve-worn rail, could reasonably be termed good track. At the same time it was apparent that constant supervision would be necessary to maintain the gauge and elevation, due to the sharp curvature, extreme wear of the light rail, absence of rail braces and the average condition of the ties, although there were probably enough good ties to maintain proper gauge.

This accident was caused by the track being out of gauge, together with the narrow gauge of the driving wheels of engine 32 and the curve-worn condition of the rails.

Although the wide gauge probably was the most important factor in the derailment of this train, the chief responsibility for its occurrence rests upon Conductor Smith, of train No. 24. Had Conductor Smith made the proper report of the derailment of his train, the attention of persons in authority would have been directed to the matter and it is probable that inspection of the engine and track would have resulted in the discovery of the conditions responsible for the derailment of that train, which undoubtedly were the same as those which caused the accident here under investigation. Under the rules and instructions of the Division of Locomotive Inspection the gauge of wheels should be maintained between 53 inches and 53-3/8 inches, wheels which are not up to the prescribed standard being required to be with-

drawn from service. Notwithstanding these requirements, the gauge of all the wheels under engine 32 measured less than 53 inches. With respect to track conditions, when examined after the derailment of the work extra, the section foreman found one point where the gauge measured 4 feet 9½ inches, and when the track was inspected, after repairs had been made, there was evidence that the tie plates had worked out of their original position and had subsequently been drawn to gauge and spiked. This condition of wide gauge evidently existed to some extent when train No. 24 was derailed, although it is impossible to say definitely what the conditions were at that time as no one made any careful examination of the track. It is believed that Section Foreman Toney should have realized the dangerous conditions existing on this curve and have paid particular attention to the maintenance of the gauge, which was supposed to have been maintained at 4 feet 9 inches. The fact that the rails were badly curve-worn undoubtedly was an important factor in allowing the left driving wheel to mount the rail after the right driving wheel had been derailed, but it is probable that the maintenance of the track and wheels at proper gauge would have prevented the accident. It is also possible that even had the rails been in good condition, the results of this accident would not have been materially different, as the driving wheels which had already been derailed would probably have resulted ultimately in the derailment of the train.

The existence of conditions developed as a result of this investigation clearly indicates that proper attention was

not being paid to the maintenance of track and equipment. Immediate steps should be taken by the officials in charge toward correcting these dangerous conditions in order that trains may be operated in safety.

All of the employees in charge of both trains were experienced men. At the time of the derailment of the work extra the crew of that train had been on duty about 4½ hours after periods off duty of approximately 20 hours or more.

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