

## INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE  
INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE  
LOUISVILLE & NASHVILLE RAILROAD NEAR SULPHUR, KY.,  
ON MAY 18, 1927.

July 19, 1927.

To the Commission.

On May 18, 1927, there was a derailment of a freight train on the Louisville & Nashville Railroad near Sulphur, Ky., resulting in the death of two employees and the injury of one employee.

Location and method of operation.

This accident occurred on the Cincinnati Division, extending between Cincinnati, Ohio, and Louisville, Ky., a distance of 113.7 miles, in the vicinity of the point of accident this is a single-track line over which trains are operated by time-table, train orders and an automatic block-signal system. The derailment occurred at a point about one-half mile north of the station at Sulphur; approaching this point from the south the track is tangent for a distance of 3,800 feet, followed by a  $6^{\circ} 07' 15''$  curve to the right 1,420.8 feet in length, including spirals, the accident occurring on this curve at a point about 743 feet from its southern end. The grade is slightly ascending for northbound trains at the point of derailment, but just south of this point there is a heavy descending grade and just north thereof there is a heavy ascending grade, and it is customary for trains to take a run for the hill.

The track is laid with 100-pound rails, 33 feet in length, with an average of 20 ties to the rail-length, tie-plated and ballasted with limestone. The curve involved is equipped with a guard rail throughout its entire length. In the vicinity of the point of accident the track is not maintained to the standards of this railroad, trouble is experienced from churning and there is a lack of ballast between the ties.

It was raining at the time of the accident, which occurred at about 8.25 a.m.

#### Description

Northbound freight train first No. 72 consisted of 36 cars and a caboose, hauled by engine 1883, and was in charge of Conductor Isaacs and Engineman Richey. This train passed Lagrange, 9 miles south of Sulphur, at 7.58 a.m., 1 hour and 13 minutes late, and on reaching a point about one-half mile north of the station at Sulphur it was derailed while traveling at a speed estimated to have been from 30 to 50 miles per hour.

Engine 1883 and the first 21 cars in the train were derailed. The engine and tender remained coupled together and came to rest on their right sides, parallel with the track and on the inside of the curve, the head end of the engine being 513 feet north of the initial point of derailment. The first 20 cars in the train were overturned and strewn about in a tangled mass of debris on the left side of the track, extending from the tender back to the initial point of derailment, the twenty-first car had only its forward truck derailed. The track was torn up from the initial point of derailment almost to where the engine came to rest. The employees killed were the engineman and fireman.

#### Summary of evidence

Conductor Isaacs stated that the air brakes had been tested at Louisville and had worked properly en route. The speed of the train was not more than 30 miles per hour while descending the grade at Pendleton, 3.3 miles south of Sulphur, and he said that to the best of his judgment an air-brake application was made on reaching a point about 2 miles north of Pendleton, reducing the speed from about 30 miles per hour to about 20 miles per hour. This rate of speed was maintained for a short distance and then it was gradually increased, the air brakes not being applied again prior to the derailment, at which time the speed was about 30 miles per hour, with the engine working steam. Conductor Isaacs, who was riding in the cupola of the caboose immediately proceeded to the engine; he then made a report of the accident by telephone, returned to the scene and endeavored to ascertain the cause, but he said the track was so badly torn up he could not determine anything from that source. Conductor Isaacs said that in his opinion, however, the train had not been operated at an excessive rate of speed while en route, and it was running only at the usual rate of speed around the curve on which the accident

occurred. The statements of Flagman Pulliam practically coincided with those of Conductor Isaacs, he was also riding in the cupola of the caboose at the time of the accident and he said that the first he knew of anything wrong was when the air brakes applied in emergency, at which time the caboose was in the vicinity of the south end of the curve. Flagman Pulliam estimated the speed of the train to have been between 30 and 35 miles per hour at the time of the accident.

Head Brakeman Hawkins was interviewed in a hospital, but his condition was such that it was not deemed advisable to question him in detail in connection with the derailment. He stated, however, that when approaching the point of accident he was riding on the seat box just ahead of the fireman and he estimated the speed to have been between 30 and 35 miles per hour, the engine seemed to swing a little to one side and then it turned over.

Roadmaster Lavin stated that he arrived at the point of accident at about 9 a.m. and found that the track had been shoved out of line in several places south of the initial point of derailment, this condition being plainly visible under the cars which had not been derailed. The roadbed was in exceptionally good shape and the drainage was good, while the section foreman had surfaced the track on the day prior to the accident. The track was slightly more than one-half ballasted and there were no swinging ties, every tie having a full bearing surface. The superelevation of the outside rail was 6 inches and immediately after the cars were moved away it was found that the elevation did not vary more than 1/8 inch at any point, while there was not more than 1/4 inch variation in the gauge. The track at the south end of the curve involved was practically open in so far as ballast was concerned, yet he considered it perfectly safe for a speed of 45 miles per hour, the maximum speed permitted for passenger trains. He did express the opinion, however, that ballast was necessary in order to prevent the track from being moved out of line when the rails were tight, but he said that in this case the rails were not tight. His examination of the engine developed that the step bracket had been cut to a depth of about 3/4 inch by the flange of the pony-truck wheel. Roadmaster Lavin did not think that track conditions contributed to the accident in any respect; and he was of the opinion that if the pony-truck wheel had been

fouled by the step bracket it could have caused the track to shift out of line. The statements of Track Supervisor Mahoney were similar to those of Roadmaster Lavon, the track supervisor also stated that some of the bottom edges of the ties were exposed on account of tamping having been done on the day prior to the accident, and he said that the greatest distance the track had been moved out of line was 7 inches. He did not think the step bracket had anything to do with causing the accident. He estimated that the speed of the train must have been about 40 miles per hour at the time of the accident, while Roadmaster Lavon thought it was 40 or 45 miles per hour.

Section Foreman Atha, who has charge of the section of track on which the accident occurred, stated that on May 13 he had worked on the northern end of the curve, surfacing the track and giving it general attention. On May 17 he worked about 20 rail-lengths south of where he had previously worked, raising the track about 1 inch, tamping it and thoroughly checking it for alinement, gauge and elevation. He considered that the track was in first-class condition, between one-third and one-half ballasted, with every tie tamped. On the morning of the accident it was raining, he was in the tool house, located about one-half mile south of the point of derailment, working on a motor car when train first No. 72 passed, traveling at an unusually high rate of speed for a freight train, between 45 and 50 miles per hour, with the engine working steam. He was of the opinion that the track was moved out of line, owing to the rate of speed that the train was traveling, and that this was contributed to by the step bracket binding against the pony-truck wheel. At the first place where the track had been moved out of line the distance it had moved was  $1\frac{1}{2}$  inches to the left; next it had been moved  $1\frac{1}{2}$  inches to the right and finally it had been moved 7 inches to the left.

Section Laborers Walker and Garrett both saw train first No. 72 when it passed through Sulphur, they considered that the speed was unusually high for a freight train.

Master Mechanic Sengel and Assistant Master Mechanic Rankin made a careful examination of engine 1883 and its tender on the day following the accident, at which time they were lying on their right sides. The principal

features developed by this examination were that the right Nos. 1, 2 and 3 wedge bolts had been bent backward and the right No. 4 wedge bolt had been broken off, indicating that when the derailment of the engine occurred the back end dropped first. The only damage done to the right side of the pilot was a scored spot on the bottom, back of the step rib, which further indicated that the rear end of the engine dropped first. The pilot-beam step brackets had been badly scored, apparently caused when the pony truck dropped off, allowing the weight of the engine to drop down on the pony-truck wheel flanges. At the time of this examination the tender had been disconnected from the engine by removing the bottom plate and drawbar pin in order to move the rear end of the tender away from the track so that trains could pass. The drawbar between the engine and tender was twisted in a manner which indicated that the tender was the first to be derailed. The throttle was open about half way, with the throttle lever bent down on the boiler hacket, indicating that the throttle was open and the engine working steam at the time of the derailment. Master Mechanic Sengel stated that in his opinion there was nothing about the engine that would have caused or contributed to the derailment, and expressed the opinion that the accident was caused by a broken rail, this rail coming in contact with the spring plank of the forward tender truck and resulting in the derailment of the tender, followed by the derailment of the engine. He did not, however, see the broken rail, nor did he know of its location in the track with respect to the first mark of derailment. It further appeared from his statements that engines of the type involved in this accident had been operating over this division for a period of about three weeks, and that after seeing the mark on the step bracket he instructed one of the roundhouse foremen to examine other engines of the same type in order to make sure that there was proper clearance and if there were indications that the engine frame was low enough to cause any fouling of the step bracket they were to cut off enough metal to provide the desired clearance. He did not, however, think the step bracket would have fouled the pony-truck wheel when rounding curves provided the track were in proper alinement.

Examination of the track by the Commission's inspectors disclosed the first mark of derailment to have been at a point about 750 feet from the southern end of the curve. There was a deep flange mark in 2

ties, located 8 inches from the gauge side of the left or west rail, and then a light mark on the next 10 ties, at which point a rail joint was broken on the east rail. At a point three ties north of where the first mark appeared on the west rail, there was a flange mark on a tie plate on the outside of the east rail, this mark appearing on three tie plates and then dropping to the ties, marking the next seven ties, up to where the rail joint was broken and the bolts sheared off. The track was then torn out for several hundred feet and one rail was broken in three pieces, this being the receiving end of the rail following the broken joint. South of the point of derailment the bottom edges of many of the ties could be seen from the center of the track to the outside of the curve. Shortly after the accident occurred full ballast had been dropped between the center of the track and the right rail for a distance of about 400 feet, but there was very little ballast between the ties on the outside of the right rail and at some points on the inside of the curve the track showed signs of churning. The work of surfacing the track which had been performed by the section foreman on the day prior to the accident had ended at a point about 400 feet south of the point of derailment; it was found that within this distance of 400 feet the track had been moved out of line at five different points, the first point being at the beginning of the open track and the last being just south of the point of derailment.

The examination of the track by the Commission's inspectors indicated that there were other points on this division on which the track maintenance was not up to standard. At Buckner, a station about 13 miles south of the point of derailment, out of 219 successive ties there were 127 in which the ballast did not engage the under surface of the ends of the ties for distances varying from 10 inches to more than 18 inches, while the depth of the ballast between the ties was not more than 1 inch; it also appeared that many of the ties were badly center-bound. Similar conditions were noted at different points within a distance of about 5 miles north of Buckner; on a 3° 15' curve the ballast was from 4 to 6 inches below the ends of the ties and in some places it measured 17 inches from the ends of the ties to the point where the first ballast engaged the under surfaces of the ties. On a section of track about one-half mile north of the station at Lagrange, comprising sixteen 39-foot rail-lengths, with oak ties and tie-plates, there was no ballast at all, the full length of the ties lying on the subgrade, the northern portion of this section of track was spiked only at every

other tie and at several joints two successive ties were without spikes, all of this being on a curve of about 20°. At a number of points along the line there were signs of badly churning track, muck and slime having been thrown upward, forming a coating of this substance over the surface of the track.

Engine 1883 is of the 2-8-2 type, having a total weight, engine and tender, loaded, of 518,000 pounds. The weight is distributed as follows: engine truck, 18,500 pounds, No. 1 driving wheels, 61,900 pounds, No. 2 driving wheels, 61,800 pounds, No. 3 driving wheels, 63,600 pounds; No. 4 driving wheels, 63,700 pounds, trailer truck, 53,500 pounds. Its driving wheel-base is 16 feet 9 inches, and the total wheel-base, engine and tender, 71 feet 8½ inches. Careful inspection made of engine 1883 by the Commission's inspectors at the point of accident, also after it was brought to Louisville and placed over a pit, failed to disclose any defect which would have caused or contributed to the accident. The left step bracket, over the engine-truck wheel, showed that it had engaged the flange, marking it to a depth of one-fourth inch. Close observation was made of the movement of engine 1883 over straight track and around curves. On straight track the mark on this step bracket was directly over the flange of the wheel but on curves the swing of the truck would move the wheel a distance of 6 inches to either side, indicating that the mark could only have been made when the engine was on straight track; the bracket had a clearance of 4 inches and at no time did it drop one-fourth inch. An engine of the same type, engine 1881, hauling a train of approximately the same tonnage, was ridden from Louisville to Sulphur, the step brackets on this engine had a clearance of 4 inches and observation developed that the clearance on curves, including the one where the accident occurred, did not drop to within 3 inches of the fouling point. Engine 1881 was a new engine, having been in service about four weeks, it rode very smoothly and showed no signs of binding or of being tight, nor did it show any sign of excessive nosing when traveling at a speed of approximately 35 miles per hour, the maximum speed permitted for freight trains.

#### Conclusions

This accident is believed to have been caused by excessive speed on a sharp curve, coupled with track which was not secure, due to the lack of ballast.

According to the testimony it is customary for trains to take a run for the grade, which apparently was the case in this instance. None of the surviving members of the crew, however, estimated the speed to have been in excess of 35 miles per hour, which is the maximum rate prescribed for freight trains, but the damage which resulted indicated that the speed probably was considerably in excess of this figure. On the other hand, if the track on this curve had been properly maintained there is no reason why it should not have provided a margin of safety sufficient to take care of a speed in excess of 35 miles per hour. The track at the point of accident, of course, was so badly torn up that nothing could be determined as to its condition, but the way in which the track immediately south of the point of accident was thrown out of line, coupled with the conditions which were shown to exist with respect to the lack of ballast not only between the ties but more especially under the ends of the ties, raises serious doubt as to whether the track was maintained in condition to withstand the strain placed upon it by rapidly moving trains. Where both speed and track conditions are involved in the occurrence of an accident, it is a matter of difficulty to determine which is the more important factor in causing the accident, but as indicated above it is believed that in this particular case had the track been maintained to the usual standards the accident would not have occurred.

This section embraced about 5 miles of track, and the section foreman is allowed 10 laborers, it did not appear that he had made any request recently for ballast to be used at this particular point. The investigation further indicated that there was nothing about the condition of the engine which could have caused or contributed to the occurrence of the accident.

All the employees involved were experienced men and 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.