INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE INTERNATIONAL-GREAT NORTHERN RAILROAD NEAR LONGVIEW JUNCTION, TEXAS, ON MAY 28, 1925.

September 16, 1925.

To the Commission:

On May 28, 1925, there was a derailment of a passenger train on the International-Great Northern Railway near Longview Junction, Texas, which resulted in the death of 1 passenger and 2 employees, and the injury of 25 passengers and 1 employee.

Location and Method of Operation

This accident occurred on the Longview subdivision of the San Antonio division extending between Longview Junction and Palestine, Texas, a distance of 81.3 miles, this being a single-track line over which trains are operated by timetable and train orders, no block-signal system being in use. The point of derailment was at a highway grade crossing located about 2.2 miles south of Longview Junction; approaching this point from the south there are 4,182 feet of tangent followed by a 2° curve to the right 975 feet in length, the derailment occurring on this curve at a point about 420 feet south of its northern end. The grade approaching from the south is level or slightly ascending for several thousand feet, and is then 1.10 per cent descending to and beyond the point of accident, 125 feet distant.

The track is laid with 85-pound rails, 30 feet in length, with an average of 18 ties to the rail-length, ballasted with about 8 inches of gravel. Six-hole angle bars are used, and the track is single-spiked, no tie-plates are used. The track was maintained in fair condition.

The track crosses Sabine River at a point about 1.5 miles south of the point of accident, the speed of passenger trains over this bridge being restricted to 20 miles an hour.

The weather was clear at the time of the accident, which occurred at 8:22 p.m.

Description

Northbound passenger train No. 2 consisted of one baggage car, one coach, one chair car, one dining car, and five Pullman sleeping cars, all of steel construction, hauled by engine 353, and was in charge of Conductor McKeithan and Engineman Tarbutton. It left Troup, the last open office, 35.9 miles south of Longview Junction, at 7:35 p.m., 39 minutes late, made one stop en route, and was derailed south of Longview Junction while traveling at a speed variously estimated to have been between 35 and 65 miles an hour.

The engine derailed to the left of the track and came to rest on its right side at the bottom of a 10-foot embankment, turned nearly end for end, the engine was approximately 1,150 feet north of the first mark of derailment. The tender came to rest immediately north of and on the same side of the track with the engine, while the baggage car was still farther to the north and on the opposite side of the track. The first coach came to rest parallel with and against the engine, one side being practically demolished by contact with the driving wheels. The next four cars were also entirely derailed, but they remained upright and were not seriously damaged. The employees killed were the engineman and fireman.

Summary of Evidence

Baggagemaster Jones, who was in the first car of the train, said he did not notice any application of the air brakes prior to the derailment, his first knowledge of anything wrong being a noise, and at about this time the car in which he was riding became derailed. Conductor McKeithan did not think the brakes were applied, while Train Porter Williams thought there was a light application immediately prior to the accident. On the other hand, Flagman Wilder, who was riding in the rear car, said he first noticed a severe application of the air brakes followed by the shock of derailment. Conductor McKeithan made an examination of the track and found nothing which could have caused the accident. Flagman Wilder said he found a mark which indicated that a wheel had mounted the rail in about the center of the highway crossing, but his lantern did not give sufficient light

to enable him to make a close examination for the purpose of ascertaining what caused the wheel to mount the rail. Flagman Wilder went back to a point near the bridge over Sabine River, but did not find anything to indicate that any of the equipment had been dragging, or that anything had been dropped from the engine. There were no crossing planks between the rails at the grade crossing, but Flagman Wilder said he did not make a sufficient examination to determine whether any of the gravel between the rails was unusually high or close to the rail.

The first indication of derailment was a flange mark, apparently made by the left front engine-truck wheel, on the ball of the outside rail, beginning about 1 inch from the gauge side of the rail, 27 inches from its leaving end, in the approximate vicinity of one of the ruts made by vehicles moving over the crossing. This mark led toward the outside of the rail, dropping off the rail at a point about 4 ~~inches~~ feet from where it first appeared. The next mark was on a cattle-guard tie, 14 feet farther north, followed by marks on each of the seven succeeding cattle-guard ties. The first flange mark on the inside of the inner rail appeared on a tie at a point 10 feet 8 inches north of where the first mark appeared on the ball of the outside rail. This pair of derailed wheels apparently continued on the ties for a distance of 811 feet to the point where the second pair of wheels became derailed, the flange marks then leading off to the left for a distance of about 70 feet until they reached the ends of the ties, beyond which point the track was entirely torn up by the derailed equipment.

Examination of the track failed to disclose anything to indicate the presence of dragging equipment, either on this train or on any preceding train. The gauge was generally well maintained, but the elevation on the curve was quite irregular. At the 9th joint south of the point of derailment, the elevation of the outside rail was $3\frac{1}{2}$ inches, while at the center of the rail immediately north of that joint the elevation was $4\frac{1}{2}$ inches. This difference of 1 inch in half a rail length also obtained at another point a short distance to the south. Proceeding northward from the point where the elevation was $4\frac{1}{2}$ inches, the amount of elevation gradually decreased until at the rail joint located about 27 feet south of where the first wheel mounted the rail the elevation was only $1\frac{1}{2}$ inches; it was 1 3/8 inches at the center of this rail, 13 feet south of the point of derailment, and $2\frac{1}{4}$ inches at the point of derailment. The rail on which the first mark of derailment appeared, was slightly worn but not enough to

be a factor in causing the accident. The joints at either end of this rail were tested by placing an engine on them and also by placing a steam derrick on them, but in each case they were found to be solid and well supported.

The public highway crosses the railroad track at an angle of about 45°. There are no crossing planks between the rails, the space being filled with gravel similar to that used for ballast. This gravel was rather compact in its nature, there being only a little loose gravel on the surface, as well as a little at a joint on the inside rail which had been raised by the section foreman on the morning of the accident.

Section Foreman Rogers, in charge of the section on which the accident occurred, stated that on the morning of the accident he had been picking up joints, working in advance of a welding machine, but the men doing the welding had only reached a point about 10 joints from the crossing, none of the joints in the immediate vicinity of the crossing having been welded. He said that one of the joints he had picked up was about two joints south of the first mark of derailment, and that while working in this vicinity he had measured the elevation and found it to be 2 inches, whereas the elevation intended to be maintained was 2 5/8 inches, Section Foreman Rogers further stated that he considered the elevation to be practically uniform, and that when he last passed over the crossing on a motor car at about 3:40 p.m. he noticed nothing wrong.

Roadmaster Kadernoschka said that while it was the intention to maintain an elevation of 2 5/8 inches, he thought 2 inches would have been sufficient for trains moving at a speed of 60 miles an hour, and he did not think the damage caused to the track indicated that the derailment was due to insufficient elevation. From the marks on the track, the condition of the equipment, etc. he estimated that train No. 2 was traveling at a speed of 60 or 65 miles an hour at the time of the accident. He further stated that the gauge and alinement were in good condition, and the only thing he noticed was that the surface was somewhat irregular. He expressed the opinion, however, that there was something which had caused the left forward engine-truck wheel to be raised, allowing it to drop down on the running surface of the rail, but he was unable to find any foreign matter in the vicinity of the crossing which might have caused the accident.

District Engineer Hooper corroborated the statements of other witnesses as to the marks which indicated that the left forward engine-truck wheel had mounted the outside rail at the crossing, and he also stated that he could not find anything definite to indicate that there had been an obstruction of any kind on the running surface of the rail. The lowest elevation he found was 1 3/8 inches, located opposite a joint on the inside rail, 12 feet south of the point of derailment. He said the surface of the outside rail was good, and that the irregularity in elevation was due to the uneven surface of the inner rail, and he expressed the opinion that a speed of 65 miles an hour would be the maximum safe speed for the operation of trains on a 2° curve with an elevation of 2½ inches. Mr. Hooper acknowledged that the American Railway Engineering Association recommends an elevation of 4¾ inches for a speed of 60 miles an hour on a 2° curve, but said his experience had taught him that 2½ inches would be within the margin of safety, considering the type of power in use, if larger engines were used on freight trains, then the elevation should be increased Mr. Hooper agreed with Roadmaster Kadernoschka in his estimate of the speed of train No. 2 at the time of the accident.

Assistant Chief Engineer Bond stated that an elevation of about 2 inches was maintained in order to allow for trains moving at low rates of speed. When asked if under such circumstances it would not be safer to restrict the speed of high-speed trains on such curves, he said he did not think an elevation of 2 5/8 inches, which is the elevation intended to be maintained on this curve, would be dangerous. Inquiries were made by the officials of this railway of six different railroads operating in that part of the country, namely, St. Louis Southwestern Railway, Missouri-Kansas-Texas Railroad, Atchison, Topeka & Santa Fe Railway, Texas & Pacific Railway, St. Louis-San Francisco, Railroad, and Southern Pacific Company; four of these railways replied that they followed the recommended practice of the American Railway Engineering Association; on one railway the elevations used were slightly less than those recommended, while on the 6th railway the elevations were 1 inch for each degree up to 4°, while the speed of passenger trains was restricted to 50 miles an hour. The question was also asked of these railways whether they considered 2½ inches to be a safe elevation on a 2° curve for trains moving at the rate of 50 or 60 miles an hour, maximum speed. The replies varied; the official of one railway said such an elevation was not con-

sidered safe, while the majority of the others seemed to be of the opinion that 2¼ inches would be safe for track maintained in good condition.

Engine 353 is of the 4-6-0 type, having a total weight, engine and tender loaded, of 343,000 pounds. It was built in 1923, and was received from the shops on April 28, 1925, after having received Class 3 repairs, since which time it had traveled 5,397 miles. Engine 353 had been inspected prior to its departure on this trip, but nothing wrong was found, and careful examination both before and after it was derailed failed to disclose the presence of anything which could have contributed to the occurrence of the accident, the only thing noticed being very slight wear on the flange of the left forward engine-truck wheel. There were rail cuts on the left back engine-truck wheel and on the left forward driving wheel, tending to support the idea that the left forward engine-truck wheel was the first to become derailed, thus placing a sudden severe strain on the back truck wheel on that side, which strain was shifted to the forward driving wheel when the engine-truck became entirely derailed. There were also indentations both in the flange and in the tread of the left forward engine-truck wheel. One was 5/16 inch in diameter and about 1/128 inch in depth, and in this particular indentation particles of rock were found to be firmly imbedded. There were several scratches near this indentation which were about 1¼ inches in length. At another point there was an indentation on the throat of the flange 9/16 inch in length, 7/16 inch in width, and 1/16 inch in depth, and at a point about 1 1/2 inches from this mark there was another mark, located on the tread, which was 5/8 inch in length. The two marks last mentioned looked as if they might have been made by a piece of metal.

Conclusions

It is believed that this accident was due to failure to maintain the surface of this curve in proper condition, coupled with an elevation which was inadequate for the operation of trains at unrestricted speed.

There is no speed limit for passenger trains except at certain specified points, one of which was at the bridge over Sabine River, about 1½ miles from the point of accident, where the speed of passenger trains is restricted to 20 miles an hour. There was evidence to indicate that Engineman

Tarbutton reduced the speed at this point, although to what extent is a matter of conjecture. It is also a matter of doubt as to how fast the train was moving at the time it was derailed; Conductor McKeithan, who made the minimum estimate, thought the spped was 35 or 40 miles an hour, but on the other hand Roadmaster Kadernoschka and District Engineer Hooper, judging entirely by the conditions as they existed after the occurrence of the accident, estimated the speed to have been 60 or 65 miles an hour. In either event, however, the engineman is not at fault since the speed on this curve was not restricted in any way.

Measurements showed that the elevation on the curve gradually increased from the southern end until it reached a maximum of about 4½ inches, and that it then began to decrease until when near the center of the curve there was a point where the elevation was only 1 3/8 inches. It also appeared that south of where the first wheel was derailed there were seven points where the elevation varied from 3/4 inch to 1 inch within a distance of 15 feet, while there was one variation of 1 7/8 inches within a distance of 45 feet.

The recommended practice of the American Railway Engineering Association provides for an elevation of 4¾ inches on a curve of 2° for a speed of 60 miles an hour, whereas on the curve on which the accident occurred the elevation intended to be maintained was only 2 5/8 inches. Such an elevation undoubtedly takes advantage of much of the margin of safety intended to be provided by the recommended elevation of 4¾ inches, and when the elevation is even further reduced to 1 3/8 inches, and there is also in existence a variation of 3 inches between the maximum and minimum elevations within a distance of 250 feet, it seems more than probable that the margin of safety intended to be provided is entirely obliterated. If, as was stated in the testimony, it is desired to keep down the elevation in order to facilitate the movement of trains at low rates of speed, restrictions should be placed in effect, definitely limiting the rate of speed at which passenger trains may be operated when passing around such curves.

Some of the testimony indicates that the accident might have been due to small stones on or close to the gauge side of the outer rail, the probable result of traffic moving over the highway, and attention was also drawn to the

fact that a piece of metal on the rail might have been responsible for the occurence of the accident. It is believed, however, that the facts pointed out in the preceding part of the conclusions of this report offer an adequate explanation for the occurrence of the accident, and indicate clearly enough the steps which should be taken for preventing other accidents of a similar character.

The employees involved were experienced men, at the time of accident the crew of train No. 2 had been on duty btween 3 and 3½ hours, after from 11 to 18 hours off duty.

Respectfully submitted,

W. P. BORLAND

Director.