INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE DENVER & RIO GRANDE WESTERN RAILROAD NEAR GRASSY, UTAH, ON MAY 2, 1923.

June 22, 1923.

To the Commission.

On May 2, 1923, there was a derailment of a passenger train on the Denver & Rio Grande Western Railroad near Grassy, Utah, resulting in the death of 4 passengers, 2 employees, and 1 trespasser, and the injury of 62 passengers, 9 employees and 3 other persons. This accident was investigated in conjunction with a representative of the Public Utilities Commission of the State of Utah.

Location and method of operation.

This accident occurred on the Second District of the Green River division, extending between Green River and Soldier Summit, Utah, a distance of 96.3 miles, in the 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 on a small fill at a point about 2.8 miles east of Grassy. Approaching the point of accident from the west, beginning at mile post 587, at Grassy, the track is tangent for a distance of 6,300 feet, followed by a curve to the left of 3° which is 2,350 feet in length, 1070 feet of tangent, a curve of 3° to the right 1,774 feet in length, and then 3,467 feet of tangent extending to the point of accident. The grade is 1.1 per cent descending, compensated for curvature. The track is laid with 85-pound rails, 33 feet in length, with an average of about 30 fir ties to the rail-length, single-spiked, partly tie-plated, and ballasted with cinders about 18 inches in depth, four-hole splice bars and anti-rail creepers are also used. Under bulletin No. 451, issued December 5, 1920, passenger trains are not permitted to exceed a speed of 45 miles an hour on the Green River division. The weather was clear at the time of the accident, which occurred at about 10.53 p.m.

Description.

Eastbound passenger train No. 2 consisted of one baggage car, two coaches, three Pullman sleeping cars, one dining car, and four Pullman sleeping cars, in the order named, hauled by engines 779 and 790, and was in charge of Conductor Turner and Enginemen Westbrook and Rader. The cars were of all-steel construction with the exception of the fourth, fifth, seventh, and eighth cars, which were of steel underframe construction.

This train passed Mounds, 16.4 miles from Grassy and the last open office, at 10.26 p.m., three minutes late, passed Grassy about on time and was derailed while travelling at a speed estimated to have been between 30 and 40 miles an hour.

The entire train, with the exception of the last four cars, were derailed, the third and fifth cars coming to rest on their sides down the south side of the embankment, while the other cars remained upright and either partially or wholly on the roadbed. Engine 779, together with its tender, was derailed to the left, and came to rest down the north side of the embankment, bottom up, with its head end 581 feet from the initial point of derailment, while engine 790 was derailed to the right, turned completely over, and came to rest on its right side down the south side of the embankment, its head end being 417 feet from the initial point of derailment. The employees killed were the engineman of engine 790 and the fireman of engine 779.

Summary of evidence.

Engineman Westbrook said he made an air-brake application of 8 or 10 pounds to steady the train on the curve approaching Grassy, and that on reaching the tangent track at that station the speed was about 30 or 35 miles an hour. He said he then allowed the train to drift down the grade until another application of the air brakes was made approaching the first curve east of Grassy. He then released the brakes and allowed the train to drift around the second curve and to the point of accident, when the brakes were applied by the parting of the train. His first knowledge of anything wrong was when he felt a jerk on his engine, which came from behind, after which his engine started to turn over; he estimated the speed at

this time at about 30 or 35 miles an hour. He stated that although he did not have time to look back to ascertain what was wrong, he thought he saw the reflection of fire from under engine 790, which in his opinion was the first to be derailed. Engineman Westbrook stated that the air brakes worked properly and he noticed nothing unusual en route, passed Grassy on time, 10.49 p.m., noticed no unusual track conditions, and had no occasion to steady the train on account of any rolling or rocking motion of the engine. He also said the tender was filled with water and coal at Soldier Summit, 64.6 miles from Grassy, and that there was at least a half tank of water and about 10 tons of coal left at the time of derailment, about 10.53 p.m.

Fireman Gillies, of engine 790, said that just before the accident occurred, he was getting on his seat box when the forward end of his engine appeared to rise, at which time he saw a streak of fire. Prior to this he had noticed nothing unusual with the riding of either engine. He stated they passed Grassy on time, estimated the speed at about 40 miles an hour at the time of the accident, and said he found Engineman Rader's watch after the derailment, the crystal being broken, and it had stopped at 10:52.30. The first intimation other members of the crew had of anything wrong was when the accident occurred.

Inspection of the track after the derailment disclosed two low rail joints in the south rail, about three rail lengths west of the first mark of derailment. These low joints were two rail lengths apart, and showed signs of having worked in the ballast. Otherwise the surface and alinement appeared to be good. The gauge was measured at several points on both sides of the derailment and was practically standard.

The first mark of derailment appeared on the running surface of the north rail, apparently caused by a wheel flange It extended for a distance of 29 feet, then dropped to the ties on the outside of this rail, the ties being similarly marked on the gauge side of the south rail; these marks then extended gradually in a diagonal line towards the ends of the ties and then back toward the north rail, and after they had traveled a short distance in that position the track was torn up for about three car lengths. From this point to where engine 799

came to rest, an additional distance of about two car lengths the track was not so badly damaged. At the point where the track began to be torn up there was a broken rail on the north side of the track, the break occurring at a point 9 feet 8 inches from the receiving end, and was 72 feet east of the first wheel marks on the ties.

It seems probable that the marks were made by the rear tender truck of the first engine, and that when the truck worked outward toward the ends of the ties, it pulled the front end of engine 790 against the north rail with sufficient pressure to break the rail, thereby resulting in the general derailment. This probably caused the ties to bunch, which raised the front end of engine 790, forcing the engine trucks to the north and turning the engine to the south, down the embankment. In turning over, the coupler at the head end of engine 790 was twisted over the top of the adjacent coupler in the rear of the tender of engine 779, as indicated by the marks on both couplers and on the under side of the buffer casting of the tender Apparently all of the driving wheels on the right side of engine 790 were derailed to the north and rubbed against the gauge side of the south rail, as indicated by the shearing marks on the outside of the tires, the counter balances riding on top of the rail. The engine trucks of this engine were only slightly damaged.

After engine 779 had broken away from engine 790, the derailed tender truck of engine 779 apparently followed the north rail closely to the point where it became separated from the tender, throwing the tender to the left, as indicated by flange marks on the under side of the frame, and causing the forward truck to spread the rails under the engine and turn it over to the left, there were marks on the tire and counterbalance of the right back driving wheel of this engine indicating that it had dropped between the rails, which supports the engineman's view that this engine was derailed from the rear.

Travelling Engineer Cowan, who was riding in the second car at the time of the derailment, and Master Mechanic Perkins made an inspection of both engines subsequent to the accident but found nothing that would have caused the accident.

Roadmaster Quinn went over the track at the point of derailment on a motor car during the forenoon of the day of the accident and noticed nothing unusual, and considered this particular section of track good for a speed of 60 miles an hour. Section Foreman Demas stated he personally inspected this section of track three days prior to the accident, and a trackwalker went over it on the day of the accident, but nothing unusual was noticed.

Both engines are of the 4-6-0 type, each having a total weight, engine and tender, loaded, of 325,400 pounds. Each tender has two four-wheel trucks, and a loaded weight of 141,400 pounds, the inside measurements of the cisterns are 10' x 26' x 4'10½" They were equipped with four 8-inch and two 24-inch swash plates on each side of the cistern to lessen backward and forward surge of the water, and three 8-inch plates used as stiffeners on the back sheet and to lessen lateral surge; all of these plates were ¼ inch thick and extended the full height of the cistern. The truck side bearings on these tenders are located 32½ inches from the center line of the center pin to the center line of the side bearing, which is 4½ inches outside of the gauge of the track, 3/8 inch clearance being maintained.

A test was made subsequent to the accident, by the Commission's inspectors, together with officials of the railroad, to determine the necessity of additional swash plates in the type of tender involved in this accident. A tender of this type was ridden in the vicinity of the point of accident, and the speed of train No. 3 was duplicated as nearly as possible, the tender carrying about 8 tons of coal and 22 inches of water. The water surged laterally with such force that the top sheet or covering was raised frequently.

Conclusions.

This accident is believed to have been caused by rocking of the tender of the first engine, due to the lateral surge of the water, unevenness in the track, and the speed at which the train was being operated.

The evidence indicated that there were no defects in running gear which could have caused the accident, but that the swash plates in the tenders of the two engines were not sufficient It also appeared that there were two low joints

just west of the initial point of derailment, and it is believed that the lateral surge of the water, undoubtedly accelerated by the low joints, resulted in the tender of engine 779 rocking to such an extent as to permit the wheels on the north or left side to mount the rail and result in the subsequent derailment of the train, these tenders were built without the swash plates usually provided to guard against lateral surge of the water. Not only did the position of the equipment indicate that the speed at the time of derailment was higher than was generally estimated by the employees but it is to be noted that the train was on time at Grassy, and apparently travelled the distance of about 2.8 miles from that point to the point of derailment in about 3 1/2 minutes, or at an average speed of 48 miles an hour. If the speed were reduced when passing Grassy and also approaching the curve west of the point of derailment, and the train then allowed to drift down the 1.1 per cent grade east of the curve, undoubtedly its speed at the time of derailment was higher than its average for the entire distance.

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All of the employees involved were experienced men, at the time of the accident they had been on duty ~~more~~ than 3 hours, after having been off duty more than 10 hours.

Respectfully submitted,

W. P. BORLAND,

Director.