January 12, 1916.

IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE LINE OF THE OREGON-WASHINGTON RAILROAD & NAVIGATION CO. NEAR FREEMAN, WASH., DECEMBER 1, 1915.

On December 1, 1915, there was a derailment of a passenger train on the line of the Oregon-Washington Railroad & Navigation Co. near Freeman, Wash., which resulted in the death of one employee and the injury of three passengers. After investigation of this accident the Chief of the Division of Safety submits the following report:

Between Spokane and Manito, Wash., a distance of 21.8 miles, the trains of the Chicago, Milwaukee & St. Paul Railway are operated over the tracks of the Oregon-Washington Railroad & Navigation Co. The train involved in this accident was eastbound train No. 16, of the Chicago, Milwaukee & St. Paul Railway, en route from Tacoma, Wash. to Chicago, Ill. While on the tracks of the Oregon-Washington Railroad & Navigation Co., however, this train is known as train No. 553, and its time-card direction is westbound instead of eastbound. Westbound train No. 553 consisted of one mail car, one baggage car, one coach, one tourist sleeping car, one dining car, two standard sleeping cars and one observation car, all of all-steel construction, hauled by locomotives 5307 and 5001, and was in charge of Conductor Sheridan and Enginemen Seamlon and Schmitz. It left Spokane at 7:50 a.m., on time, passed Mica, the last telegraph station, at 8:26 a.m., 4 minutes late, and at about 8:35 a.m. was derailed at a point about one and one-quarter miles west of Freeman while running at a speed estimated

to have been about 25 or 30 miles per hour.

The dining car, the two standard sleeping cars and the observation car were derailed, the dining and sleeping cars remaining on the right of way in an upright position, coupled to the forward portion of the train, the rear truck of the dining car rerailing itself. The observation car broke away from the car ahead of it and came to rest on its side about 30 feet from the track at a point about 325 feet beyond the point of derailment. The rear end of the forward portion of the train stopped 1,122 feet beyond the point of derailment. The employee killed and the passengers injured were riding in the observation car.

This part of the Oregon-Washington Railroad & Navigation Co., is a single track line, train movements being protected by the automatic block signal system. Approaching the point of accident from the east, there is a tangent 640 feet in length, followed by a curve of 4 degrees 2 minutes, leading to the left, this curve being 1,091 feet in length. The derailment occurred at a road crossing near the middle of this curve, at which point the track was level. The track is laid with 75-pound rails, 33 feet in length, with about 18 treated ties under each rail, ballasted with about 18 inches of coarse gravel. Tie plates are used, single spiked on the outside and double spiked on the inside of curves. The weather was clear and cold.

Examination of the equipment of the derailed train failed to disclose anything which might have caused this derailment. Examination of the track showed that there was a broken rail on the outside of the curve. This rail was rolled in 1906 and was branded

as follows: "Carnegie III 1906 E.T. Heat no. 11630." This rail was first placed in service on straight track in 1907, near The Dalles, Oregon, where it remained until April, 1913. It was then stored until March, 1915, when it was shipped to Freeman, and about October 1, 1913, was placed in the track at the point where this accident occurred. The rail had therefore been in service about six years, about two months of which time had been at the point where it was when it failed under train No. 933.

The rail broke at the receiving end, the first point of rupture being slightly over one foot from this end. Extending from this point toward the leaving end of the rail, a section about 8 feet 4 inches in length was broken into many small pieces, 68 of which were found, while about 12 inches of this section could not be found. Examination of the rail showed that on the gauge side of the ball there was a seam, or split, about 22 feet in length, which ranged in depth from one-half inch to one and one-half inches. This split began near the receiving end of the rail but was not visible at the end.

The section foreman in charge of this section stated that when placed in service on this curve, the rail had been bent into place with track bars. At this time he made a careful examination of the rail and it appeared to be all right. He also stated that he inspected the track at this point at about ~~XXXX~~ 4:15 p.m. the day preceding the accident, at which time he did not notice any defects, while a passenger train of the Oregon-Washington Railroad & Navigation Co. had passed over this part of the road about 35 minutes in advance of train No. 933, at which time nothing wrong was noticed.

Engineman Scanlon, of the leading locomotive, stated that the automatic signals approaching the point of accident were in the clear position and the first indication he had of anything wrong was when he felt the air brakes being applied, at which time the speed of the train was between 25 and 30 miles per hour. He did not feel anything when his locomotive passed over the rail. He further stated that the application of the brakes was not an emergency application, the brakes apparently being applied gradually. His statements were corroborated by those of Engineman Schultz, of the second locomotive. The firemen of both locomotives stated that they did not notice anything wrong when their locomotives passed over the track.

Baggage Master Mason, who was riding in the second car at the time of the accident, stated that he noticed the car pass over something but that it was more of a sound than anything else and so slight that he did not pay any attention to it. Another employee, who was riding in the baggage car at the time, also stated that he noticed something and thought that possibly it was some dirt on the track, and remarked that they had passed over a road crossing. He did not feel any heavy application of the air brakes, stating that the train seemed to come to an ordinary stop. Head Brakeman Holmes, who was riding in the coach, the third car of the train, stated that the car ran over something that felt like a frog, or something on the track. Just after the car had passed over it he felt the brakes being applied. The statements of these employees relative to the speed of the train at the time of derailment indicated that it was from 20 to 25 miles per hour.

While the immediate cause of the derailment was the fracture of the rail, of which 62 fragments were recovered, the time of the incipient rupture doubtless was when one of the locomotives was over the rail. The number of fragments of the broken rail, the short pieces into which they were separated, and the battered ends of short pieces of the head, all indicatethat a number of wheels struck the rail after the incipient rupture had formed.

The type of fracture was a split-head rail. Its length covered a considerable portion of the rail, as finally developed. In depth, the plane of rupture, starting a short distance below the running surface, practically separated the head down to its junction with the web. The tractive force of the engines would tend to cause flange pressure on the low rail of the curve, and to this circumstance in part is attributed the fact that the forward portion of the train remained on the rails. After the first break, the opening increased in length as fragments were successively broken off, the receiving end of the main part of the rail eventually reaching such a length as permitted the derailed trucks to pass through the opening.

Fractures of this type commonly owe their origin to seaminess in the head of the rail. The lateral flow of the metal of the head under wheel pressures causes a seam to be developed when such flow of metal encounters a streak below the surface of the head. Frequently several seams lying close together merge and form one continuous seam which may finally reach the ends of the rail, although having its origin at some intermediate point.

Split-head rails are more common than piped rails, and have a different origin, although the latter term in many cases is incorrectly used in describing rail failures of this type.

This rail failed by reason of a split head. This is a type of failure concerning which premonitory signs are generally exhibited by the head of the rail during the development of the fracture. An increase in width, or local depression under the head are signs of the presence of a split in the head. Interior seams in the head of the rail cannot be detected in the track until there is some manifestation of their presence by the distortion of the rail. The cause of this seamy condition goes back to the condition of the metal in the ingot and the conditions of manufacture. The large number of rail failures due to seaminess of the metal, both in the head and in the base, constitutes a reason for continued activity in the endeavor to overcome their presence, as has been noted in several previous reports covering rail failures of this character.