

DESCRIPTION OF THE ACCIDENT.

Train W 4 left the rails at mile 130, chain 79, link 59, approximately 4 miles north of Turakina, shortly after it had entered the curve of 6·4 chains radius. The engine, tender, and leading car on leaving the rails fell outwards to the left against the side of the cutting and travelled over the sleepers and ballast and along the batter for a total distance of 142 ft. from the mark on the outer rail, which appears to indicate the point at which the left-hand leading-bogie-wheels of the engine left the rails. The couplings and brake-hose pipe between the first and second cars parted. The second car continued to run on the rails until it struck the rear right-hand corner of the derailed and tilted leading car. This caused it to be thrown off the rails to the right, and it was followed by the third and fourth cars, which also struck the leading car. The leading bogie of the fifth car was also derailed to the right. The sixth car and the guard's van remained on the rails. The leading end of the second car travelled 191 ft. beyond the point of derailment, or 304 ft. from its situation at the time when the engine left the rails—that is, its leading end came to rest approximately 50 ft. ahead of the position at which the front of the engine came to rest. The impact with the corner of the leading car tore out most of the front and half of the left-hand side of the second car. Part of the front and side of the third car and rather less of the fourth car were similarly damaged. The bogies of these cars were all torn off, and some were completely wrecked.

POINT OF DERAILMENT.

We have fixed the point of derailment at mile 130, chain 79, link 59. This point is 110 ft. north of the commencement of the 6·4 chain radius curve. There are no marks on the rails or sleepers south of this point. At this point, what has been described as a "scrape-mark" about $\frac{1}{2}$ in. wide commences on the outer side of the head of the outer rail. This mark extends for a distance of 20 in., at which point, or just beyond which point, occurs the first screw-spike head, which bears evident marks of having been struck by the flange of a wheel. At 2 ft. 9 in. north of the beginning of the scrape-mark is a diagonal mark about 12 in. long across the top of the same rail. The scrape-mark was obviously caused by the inner side of the flange of the leading left-hand bogie wheel of the engine, and the diagonal mark was probably caused by the flange of the second bogie wheel, but the latter mark may have been caused by the passage of one of the driving-wheels. The diagonal mark ends over a sleeper, the second from the point of derailment. On this sleeper, beyond the outer rail, appears a mark evidently made by the flange of a wheel running over the sleeper. This mark was presumably made by the leading bogie wheel. The next sleeper bears two parallel marks, and the next again three parallel marks. From this point on, for a distance totalling 37 ft. from the point of derailment, all the sleepers are badly smashed at the left-hand end, but no corresponding marks appear on the sleepers between the rails for this distance. At the next sleeper beyond this distance a mark appears between the rails, which may have been caused by any of the wheels of the following part of the train, as from this point onward the sleepers for a considerable distance were all damaged by the passage of the different vehicles. At a point 34 ft. north of the point of derailment the fishplate bolts were broken, the fishplates displaced, and the following length of the left-hand rail displaced towards the centre of the track. At its northern end this length of rail was still fully attached to the rest of the track.

POSSIBLE CAUSES OF ACCIDENT.

The possible causes of the accident may be grouped under six heads:—

- (1) Defect in track.
- (2) Obstruction on track.
- (3) Operating factors.
- (4) Defect in engine.
- (5) Defect in rolling-stock.
- (6) Excessive speed.

We propose to deal with these possible causes *seriatim*.

(1) DEFECT IN TRACK.

There had been no substantial fall of rain for five weeks, and there was no subsidence of the track. The clay formation was described as being exceptionally hard. The track had been relaid in 1930, and realigned in February, 1938. In order to ease the approach to the curve a transition curve had been put in in 1930, and this had later been lengthened and improved. The wear on the rails was well within the margin of safety. Variations in cant, gauge, and curvature of the track were also well within permissible working-limits. The track was frequently inspected, and at 4.30 p.m. on the day before the accident occurred a surfaceman took his velocipede off the track within a few yards of the point of derailment in order to allow a train to pass. He particularly noticed that the train took the curve smoothly.

We are satisfied that the condition of the track in no way caused or contributed to the accident to train W 4. The damage done to the track, to which we have already referred, occurred as a result of the accident, and was all north of the point of derailment.

(2) OBSTRUCTION ON TRACK.

The possibility of the presence of an obstruction on the track cannot be absolutely ruled out. Against this possibility, however, weight must be given to the following considerations:—

An examination of the records of cases in which an engine travelling at a moderate speed struck an obstruction on the line shows that the result was a simple derailment of two or more bogie wheels without causing the engine to overturn or even to leave the track. In fact, unless the obstruction struck was very large and heavy, an engine would be unlikely to overturn. In the present case a