

IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE  
BOSTON & MAINE RAILROAD AT WOODSVILLE, N.H., ON APRIL  
25, 1921.

May 5, 1921.

On April 25, 1921, there was a derailment of a freight train on the Boston & Maine Railroad at Woodsville, N.H., which resulted in the death of 1 employee and the injury of 3 employees. After investigation of this accident the Chief of the Bureau of Safety reports as follo :

Location

This accident occurred on that part of the White Mountains Division extending between Woodsville and Berlin, N.H., a distance of 60.45 miles. 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 in the yard at Woodsville, about 60 feet north of the yard office. The yard track from which the train involved in this accident was proceeding is tangent, leaving the yard track in a northerly direction there is a curve to the left of  $7^{\circ}$ , 84 feet in length, a curve to the left of  $1^{\circ}$  which is 30.38 feet in length, and a tangent of 13.3 feet, following which the track passes through a double slip-switch on a curve to the left of  $15^{\circ} 02'$  which is 50.1 feet in length. There is then a tangent of 13.3 feet on which the accident occurred, followed by a curve

of 1° 12' to the left, 117 feet in length, and about 1,500 feet of tangent. The yard track is practically level to a point about 400 feet south of the point of accident, the grade is then slightly descending for about 300 feet, followed by a long ascending grade which increases gradually until it reaches a maximum of 3.24 per cent at a point about 2,500 feet north of the point of accident.

The track at the northern end of the yard track, and extending through the slips, is laid with 85-pound rails, 33 feet in length, north of the slips, the track is laid with 75-pound rails. There is an average of 18 hard pine ties to the rail-length, ballasted with old cinder ballast. Except under the slips the ties are single-spiked and no tie-plates or rail braces are used, under the slips, the plates are used and rail braces are also in use opposite the moveable points. The general maintenance of the track in this vicinity as to gauge, surface and alignment is fair. The accident occurred at about 11:28 a.m., at which time the weather was clear.

#### Description

The train involved in this accident was northbound freight train extra 2359, en route from Woodsville to Berlin, N.H. It consisted of 15 cars and a caboose, hauled by engines 2359 and 2403, was in charge of Conductor Nichols and Enginemen Paine and Lyons, and was being assisted out of the yard by engine 2913 coupled to the rear end. Extra 2359 was de-

parting from the yard and had traveled a distance estimated to have been about 15 car-lengths when the leading engine was derailed at the north frog of the double slip switch.

Engine 2359 came to rest in a practically upright position, at a point about 175 feet north of where the first marks of derailment appeared. The tender came to rest in an upright position at right angles to the engine, with its left forward corner against the rear of the left side of the engine cab. Engine 2403 and the first two cars in the train were also derailed, the engine being slightly damaged. The employee killed was the engineman of engine 2359.

#### Summary of evidence

The first knowledge Fireman Bisbee, of engine 2359, had of anything wrong was when Engineman Paine made an emergency application of the air brakes, previous to this he had not felt any jar. He thought the pony truck was first to be derailed, but was not positive on this point. Head Brakeman Stanton, who was riding on the left side of engine 2359 felt the engine jump as it left the rails, it was then just north of the slips, and he said the engineman immediately applied the air brakes in emergency.

Engineman Lyons, of engine 2403, said his attention was first attracted by seeing the leading engine bouncing around and Engineman Paine looking out of the window, but on looking out himself he was unable to see anything wrong. At this time his own engine was just entering the slips, and he said

that it traveled about its own length before the brakes were applied. He had noticed no unusual motion of his engine when passing through the slips.

The statements of these employees, as well as those of all the other members of the crew, with the exception of the conductor, indicated that the train had moved from 12 to 15 car-lengths at the time of the accident, while their estimates as to its speed varied from 7 to 13 miles an hour. Conductor Nichols was not with his train, being engaged in obtaining orders at the tower north of the point of accident, and he knew nothing about the facts surrounding its derailment.

General Yardmaster Carr, who was in the yard office first noticed engine 2359 when it was about 35 feet north of the north frog of the slips, and at that time it seemed to be going up and down, he could not tell whether the driving wheels were derailed at this time. He estimated the speed to have been 12 or 15 miles an hour. The statements of the above-mentioned employees indicated that none of them had formed any opinion as to the cause of the accident.

When Enginehouse Foreman Clough examined engine 2359 after the derailment he found nothing which could have contributed to the accident in any way. The engine was last inspected on the morning of April 25, before starting on the trip on which this accident occurred, and the report for that day showed no defects. He also said there were

indications that the engine had been running to the right, the right pony truck flange being worn, while slight wear was also evident on the right forward driving wheel, in neither case had the condemning limit been reached.

Examination of engine 2359 showed that at some previous time the main frame had been binding on the pony truck frame, but this condition had been remedied recently, and there was nothing to indicate that it existed at the time of the accident. Examination of work reports showed nothing had been reported during the preceding week which could have had any relation to the occurrence of this accident. This engine is of the 2-8-0 type, with a rigid wheel base of 17 feet, and, according to the specifications on file in the office of the superintendent of motive power of this railroad, was not designed for operation on curves greater than 10 degrees.

Examination of the track showed that the first mark of derailment was a flange mark on the left side of the top of the head of the guard rail on the inside of the left rail opposite the north frog of the slips. This mark began at a point about 22 inches south of the point of the frog and extended diagonally across the head of the guard rail a distance of about 50 inches to the point where it dropped off on the right side. The next mark on this side of the track was a flange mark on the fifth tie north of where the mark last appeared on the guard rail, beginning at this point, flange marks appeared on 5 ties in succession. The next 7 ties were unmarked, then 1 tie was marked, 8 unmarked, 1

marked, 1 unmarked, 1 marked, and the next 2 ties unmarked, following which all of the ties were marked up to a point about 120 feet north of the first mark, the track was then torn up by the derailed equipment for a distance of about 3 rail-lengths. All of these marks on the inside of the left rail were within 6 or 8 inches of the base of the rail. On the right side of the track there was a deep flange mark on the point of the north frog, this mark being slightly toward the right side of the point, there was also a slight mark nearer the heel of the frog, but it was not definitely determined whether this was made at the time of the accident. North of this point the only marks on the right side of the track south of where it was entirely torn up were at rail joints, the wooden filler block on the outside of the rail at the first joint north of the frog was badly cut on its southern end and the end of the angle bar bent outward, while at the second joint the top of the nut on the second bolt was slightly marked. At the third joint, the inside angle bar was badly scraped, while the inside of the ball of the succeeding rail was also badly scraped and the elongation of the spike holes showed that the rail had been forced outward. This rail was also cracked through from the ball to the base. It was not definitely determined whether the marks on this rail and on the third joint were due to the accident or to the re-railing of the equipment after the accident.

No elevation can be given to the curve of 15° through

the slips. Measurements made of the gauge and surface beginning about 100 feet south of where the first marks of the derailment appear, showed that there were some variations in gauge, while the right rail was generally slightly lower than the left rail. Observance of the northern end of the slips while trains were passing showed that the ties settled to some extent, some of the spikes had worked upward and there was a somewhat limited up-and-down movement of the rails under passing trains. The drainage is only fair.

According to Section Foreman Camp, no work in the way of tamping, surfacing, or tie renewals had been done at the slips since November, 1920. He had last taken the gauge and level about 2 weeks previously and had inspected the slips 2 days previous to the accident. After the accident he found the frog and guard rail at which the accident occurred to be in good condition, while the gauge and surface were uneven.

Division Engineer Watson and Track Supervisor Brown thought the condition of the track was about what could be expected at this time of the year. Mr. Watson did not think this slip suitable for an engine of the type of engine 2359. While he considered a speed of 10 miles an hour high enough for the operation of trains at this point, the statements of both of these officials indicated that when an engine is operated on a curve of greater degree than that for which it is designed, the question of speed does not make much difference so far as the liability of derailment is con-

cerned, Mr. Brown saying that when the limit of safety in curvature for a particular engine is passed, no speed is safe.

There are no speed restrictions in force at this point, and observation indicates that northbound trains increase their speed rapidly in order to get a run for the heavy grade leaving the yard. In the case of the accident here under investigation, the statements of the various witnesses as to the speed varied from 7 to 15 miles an hour, it is thought the estimate of from 12 to 15 miles an hour made by General Yardmaster Carr is more nearly correct.

The accident here under investigation is the 14th derailment to occur at these slips in a period of 4 years 3 months. Of the previous 13 derailments, 4 involved engines and all of them were of the same type as engine 3359, 1 of these was due to a broken spring hanger, while the other 3 were due to the sharp curve and type of engine.

#### Conclusions.

This accident was due to the operation around a curve of 15° 02' of an engine which was not designed to be operated around curves of more than 10 degrees.

While the evidence indicates that engine 3359 had been operated in this territory for several months, during which time it had frequently passed through these slips, the fact remains that the operation of an engine where there are curves of a greater degree than that for which it is designed



is a source of constant danger and is liable to result in an accident at any time. That this is a constant menace is evident from the number of accidents which have occurred at this point in the past involving engines of the same type. Not only is a dangerous condition always present in the operation of engines of this type at this point, but if anything it is increased by the lack of speed regulations, and the failure to maintain the track in this vicinity in the best possible condition.

All of the employees involved were experienced men and at the time of the accident none of them had been on duty in violation of any of the provisions of the hours of service law.