IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE LEHIGH VALLEY RAILROAD AT AUBURN, N. Y., ON NOVEMBER 2, 1920.

February 16, 1921.

On November 2, 1920, there was a rear-end collision between a freight train and a yard train within the yard limits at Auburn, N. Y., which resulted in the death of 5 employees. Investigation of this accident was conducted jointly with the Public Service Commission of New York, Second District, as a result of this investigation the Chief of the Bureau of Safety reports as follows

The subdivision on which this accident occurred, extending between Sayre, Pa., and North Fair Haven, N. Y., a distance of 133 miles, is a single-track line over which trains are operated by time-table, train orders transmitted by telegraph, and a manual block-signal system. The yard limits extend between Fauls, 1.3 mile east of Auburn, and Throop, 3.5 miles west of Auburn. Approaching the point of accident from the east there is a tangent about 2 miles long, a 2-degree 52-minute curve to the right 1,473 feet in length and a 3-degree 9-minute curve to the right 187 feet in length, followed by about 1,200 feet of tangent extending to the point of accident. The grade is descending for nearly 3 miles, being nearly 1 per cent for more than 2 miles of this distance. It was raining at the time of accident.

Yard extra 598, consisting of engine 598 and 44 cars, in charge of Conductor Campbell and Engineman Emerson, was en route from Auburn to Throop. At about [illegible] a. m. it pulled out on the main track from what is known as the new siding, and had

proceeded about 1,000 feet west of the switch when it stalled. At about 7.40 a. m., while standing at this point, its rear end was struck by extra 1139,

Westbound freight train extra 1139, consisting of engines 1139 and 1149, 42 loaded cars and a caboose, was in charge of Conductor Wilmarth and Enginemen Fitch and Tuell. It left Sayre at 3.15 a. m. and at Freeville, N. Y., 32 miles east of Auburn, the engines were cut off for the purpose of taking water. Extra 1139 left Freeville at 6.40 a. m., passed Ensenore, the last open telegraph office, 10.7 miles from Auburn, at 7.28 a. m. and at 7.40 a. m., while traveling at a speed estimated at from 10 to 20 miles an hour, collided with the rear end of extra 598.

Both engines came to rest on their left sides, the leading engine being down an embankment on the right side of the track and the second engine on the left side of the track; both engines were badly damaged and four cars in this train were demolished, while five cars in extra 598 more or less badly damaged. The employees killed were the two enginemen and a brakeman of extra 1139.

After extra 598 stalled, Conductor Campbell started for the rear of his train and shortly afterwards heard the engineman of extra 1139 sound one long blast on the whistle, which was soon followed by two short blasts. Conductor Campbell saw the flagman 18 or 20 car-lengths east of the rear of the train, and also Yardmaster Train, giving stop signals. In the meantime, Flagman Danahey, knowing that extra 1139 was approaching, opened

an angle cock for the purpose of preventing a back-up movement and then signalled to Yardmaster Train, who had closed the switch after the yard extra had pulled out on the main track, to flag the approaching train, at the same time starting back himself with a red flag. Flagman Danahey said he heard a whistle sounded before the engines came in sight, and saw the yardmaster give a stop signal from the vicinity of the switch. As soon as the engines came in sight, apparently traveling much faster than usual, he himself began to give stop signals but he was unable to say whether or not these signals were acknowledged. According to Yardmaster Train, he had reached a point about 1,200 feet from the rear of extra 598 when extra 1139 came in sight. He said he then began to give stop signals with his hands and that the engineman of extra 1139 whistled for brakes and then acknowledged his stop signals. Yardmaster Train stated that the extra was from 20 to 25 car-lengths distant when the whistle signal for brakes was sounded, and about 10 car-lengths distant when his stop signals were acknowledged. Flagman Danahey estimated the speed of extra 1139 to have been 20 or 25 miles an hour while Yardmaster Train thought it was about 30 miles an hour, neither of them noticed any decrease in the speed or any indication that the brakes on the cars had been applied.

Fireman Curkendall, of the leading engine of extra 1139, and Fireman Hollenback, of the second engine, did not know whether or not a test of the air brakes was made when the engines coupled to the train after taking water at Freeville, but Conductor Wilmarth

said that such a test was made. The statements of all of these employees, as well as those of Brakeman Andrews and Flagman Relfe, indicated that the brakes were working properly in controlling the speed of the train on Groton Hill, a short distance west of Freeville, and also on the hill approaching Auburn. The various statements of these employees indicated that the speed of extra 1139 in the vicinity of Pauls, 1.3 mile from Auburn, was from 25 to 35 miles an hour and that an application of the air brakes, said by Fireman Curkendall to have consisted of two 5-pound reductions, then reduced the speed to 10 or 15 miles an hour, following which the brakes were released. When Engineman Fitch sounded the whistle approaching Auburn Fireman Curkendall looked out and saw extra 598, apparently about 3/4 mile distant and he said that the engineman placed the brake valve in the emergency position. He estimated the speed of the train when passing an ice house located about 1,550 feet from the point of accident to have been about 15 or 16 miles an hour, and about 15 miles an hour when passing Division Street, which is 370 feet from the point of accident. Fireman Hollenback thought the engineman of the leading engine acknowledged the stop signals of the brakeman and sounded the whistle when about opposite the ice house and thought it was at about that time that the brakes were applied. Both fireman jumped from their engines at a point near Division Street and neither was thrown to the ground in doing so. According to their statements, the last time steam was used was near the top of the hill about 3 miles from the point of accident.

Fireman Hollenback had not noticed the air gauge on the second engine, while Fireman Curkendall had noticed that the gauge on the leading engine indicated the proper pressure but did not remember when he had last looked at it. While Fireman Curkendall said Engineman Fitch did not say anything about having difficulty with the brakes, the fireman expressed the opinion that the accident was due to the failure of the brakes to work properly and to the wet and greasy condition of the rail.

Fireman Hollenback did not know what effort Engineman Tuell had made to stop the train or whether his brake valve was cut in, although he said it was possible this might have been the case. On account of the fact that the train line on the last car had been broken at Dryden, 35.4 miles from Auburn, Conductor Wilmarth did not know what brake-pipe pressure was carried between Freeville and the point of accident. Brakeman Andrews, who was riding in the caboose at the time of the accident, had ridden on each of the two engines over a part of the road. He had not heard either engineman complain about difficulty in keeping up the brake-pipe pressure and had not noticed that the brake valve on the second engine was cut in. He stated, however, that frequently the second engine runs with the brake valve cut in and that nearly always the engineman will cut in the brake valve to assist in pumping up the air after making a stop. Brakeman Andrews uncoupled the engines from the train at Freeville but thought Brakeman Schultz, who was killed in the accident, had coupled them to the train after water had been taken.

Road Foreman of Engines Dent reached the scene of the accident shortly after its occurrence and on examination of the engines found that the cut-out cock on the second engine was about 1/3 closed, while the pipe underneath was broken off. In his opinion it was in such a position as to prevent the engineman of the leading engine from having control of the train brakes. It was possible that this cut-out cock, which was about in line with the floor of the cab, might have been turned in the accident, but he thought it more probable that it was open and had been partially closed by the apron as a result of the accident; the apron was found against the handle of the valve. Engines of the type involved in this accident are equipped with one 11-inch pump, and Foreman Dent said that when these pumps were installed the practice of having the second engine assist in charging the train line had been discontinued at all times except when both engines had been detached from the train. In his opinion had the proper reduction in speed been made at Pauls there should have been no difficulty in recharging the train line by the time the stop signals of Yardmaster Train became visible; according to measurements made afterwards, these signals were visible a distance of about 2,400 feet from the point of accident.

Examination by Air-Brake Instructor Burgess of the brake equipment of the undamaged portion of extra 1139, consisting of 38 cars and a caboose, disclosed that the brakes did not apply on 5 cars while on 2 cars and the caboose the brakes were cut out; on one car the piston travel was 11½ inches, while on another car the piston travel was 2½ inches. A test run was made with this

portion of the train, hauled by two engines of the same type as those involved in the accident. Starting at the top of the grade, a speed of approximately 28 miles an hour was attained, followed by a 10-pound brake-pipe reduction; this reduced the speed passing through Pauls to 5 or 6 miles an hour. The brakes were then released and the speed of the train had increased to about 12 miles an hour when the stop signals of a man were seen, these signals being given from the point where Yardmaster Train said he was standing when he flagged extra 1139, a 10-pound brake-pipe reduction was then made and the train was brought to a stop before reaching the point where the man was standing.

Although the time-table restricts the speed of freight trains on this division to not more than 35 miles an hour, the evidence indicates that extra 1139 travelled the distance of approximately 10 miles between Ensenore and the point of accident in about 12 minutes, or at an average speed of about 50 miles an hour, including the reduced speed at Pauls and also between Pauls and the point of accident. It also appears that extra 1139 travelled the distance of 32 miles between Freeville and the point of accident in about 1 hour. It is obviously impossible for extra 1139 to have maintained this high average rate of speed, including the reduced speed between Pauls and the point of accident, observe the maximum speed limit, and at the same time comply with local time-table speed restrictions, as follows. 6 miles an hour over highway crossings at Groton, 25 miles an hour between Groton and Locke, a distance of 6.3 miles, 20 miles an hour over two bridges west of Locke, and 10 miles

an hour between the first highway crossing east of Moravia and the milk station west of Moravia.

Rule 93, of the rules for the government of the operating department for this railroad, reads as follows.

> "Yard engines will use the main track within yard limits without working train orders, subject to Rule 99.
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> "First class trains must not exceed scheduled speed within yard limits.
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> "Other trains must run prepared to stop at any point within yard limits.
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> "The location of yard limits is designated in the timetable."

In addition to this rule, the operation of yard trains within the yard at this point is governed by a special notice from the office of the superintendent, issued in 1916, which provides that yard engines will ascertain from the dispatcher, through the yardmaster, if any extras are approaching and be governed accordingly, this notice also provides that extra trains will run prepared to stop within the range of vision. The evidence in this case indicates that the crew of extra 598 had been notified by the yardmaster of the time extra 1139 left Greenville.

This accident was caused by extra 1139 being operated at an excessive rate of speed within yard limits.

In the statements of the various members of the crew are correct, the brakes were working properly in controlling the speed of the train at various points en route, including a slow

down at Pauls, within about 1 mile of the point of accident. On the other hand, the statements of Yardmaster Train and Brakeman Danahey, as well as the estimates of the speed made by the fireman of the leading engine of extra 1139, indicate that the application of the brakes by Engineman Fitch when he was flagged did not noticeably reduce the speed of the train, and there is also evidence to the effect that no grinding of brakes shoes against wheels was noticed. Under these circumstances, it seems likely that something occurred between Pauls and the point of accident which affected the efficiency of the air-brake system. The evidence indicates that the engineman in charge of the second engine often cuts in his brake valve in assisting the leading engine to pump up brake-pipe pressure, and it is possible that Engineman Tuell may have taken such action after the speed of the train had been reduced by the brake application in the vicinity of Pauls, forgetting to cut out the brake valve when approaching Auburn. While the evidence clearly indicates that the speed of extra 1139 had been excessive between Freeville and the point of accident, it does not appear that the speed between Pauls and the point of accident was such that the train could not have been brought to a stop in time to avert the accident had the brakes worked properly.

Engineman Tuell was employed as a trainman in August, 1903, and as a fireman in December the same year; he was promoted to engineman in 1907. Engineman Fitch was employed as a trainman in

1902, fireman in 1905, and resigned in the same year; he was re-employed as a fireman in 1907 and promoted to engineman in 1912.

At the time of the accident the crew of extra 1139 had been on duty less than 6 hours, after about 2 hours off duty, previous to which they had been on duty about 8 hours after about 13 hours off duty. The crew of extra 598 had been on duty about 1 hour, after about 15 hours off duty.