INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY CONCERNING AN ACCIDENT ON THE LEHIGH VALLEY RAILROAD AT BOWMANSTOWN, PA., ON APRIL 24, 1934.

June 19, 1934.

To the Commission:

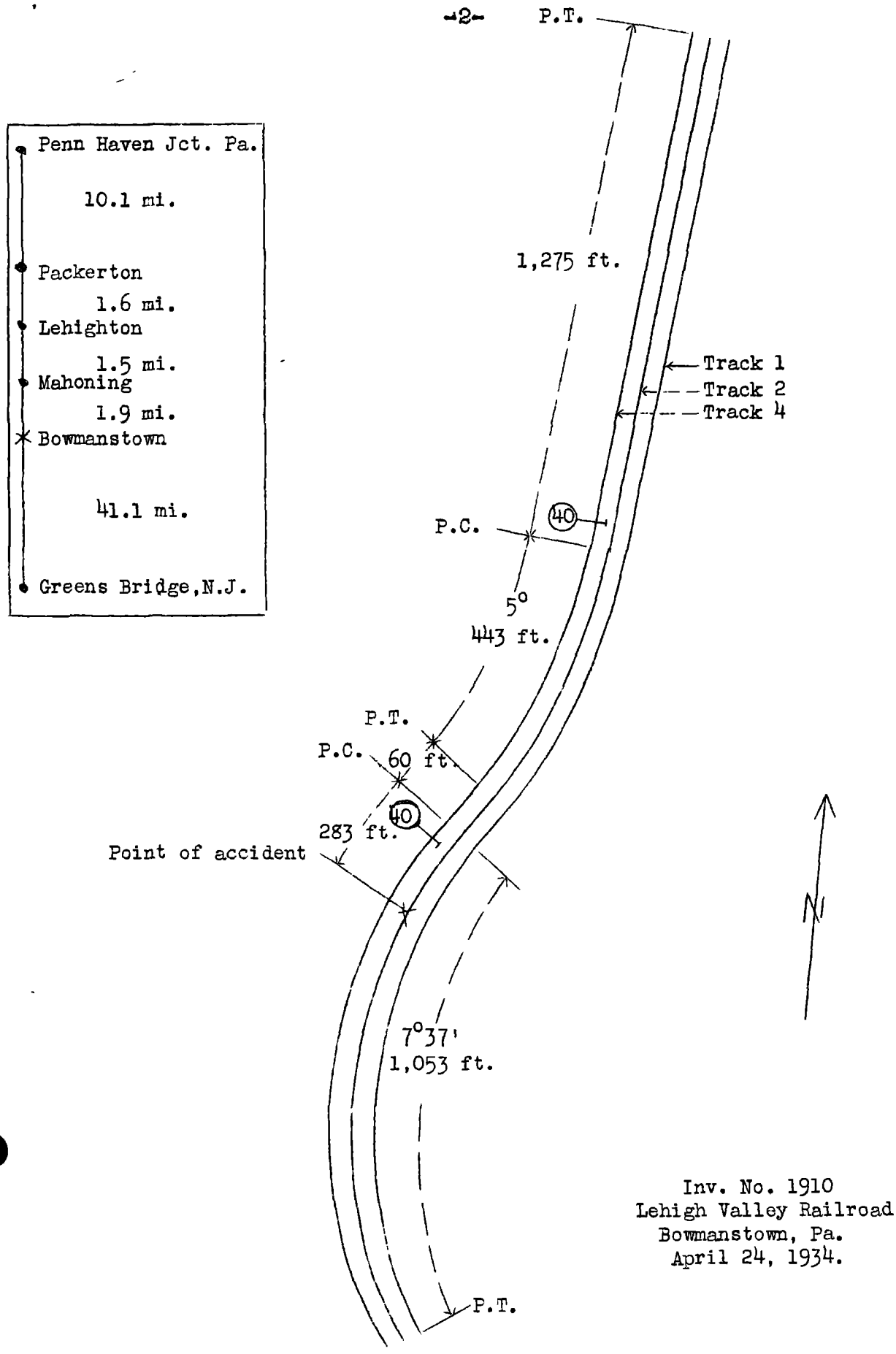
On April 24, 1934, there was a derailment of a freight train on the Lehigh Valley Railroad at Bowmanstown, Pa., which resulted in the death of 1 employee and the injury of 4 employees. The investigation of this accident was held in conjunction with a representative of the Public Service Commission of Pennsylvania.

Location and method of operation

This accident occurred on that part of the Lehigh Division extending between Penn Haven Junction, Pa., and Greens Bridge, N. J., a distance of 56.2 miles; in the vicinity of the point of accident this is a double-track line over which trains are operated by time table, train orders, and an automatic block-signal and train-stop system, the latter being of the intermittent-inductive type. A storage track parallels the main tracks on the south; the tracks are numbered, from north to south, 1, 2 and 4, the accident occurring on track 2 at a point 1,720 feet west of the station at Bowmanstown; approaching this point from the west, the track is tangent for a distance of approximately 1,275 feet, followed by a 5° curve to the right 443 feet in length, tangent track for a distance of 60 feet, and then a 7° 37' curve to the left 1,053 feet in length, the accident occurring on this last-mentioned curve at a point 283 feet from its western end, or 163 feet from the leaving end of the spiral. The grade is slightly descending for eastbound trains, being 0.28 percent at the point of accident.

The track is laid with 136-pound rails, 39 feet in length, with an average of 24 ties to the rail length, fully tieplated, and is ballasted with crushed stone; the track is well maintained. The speed of trains on the curve on which the accident occurred is restricted to 40 miles per hour, speed-limit signs being located along the right of way just west of the 5° curve and also on the 7° 37' curve just east of its western end.

The weather was clear at the time of the accident, which occurred about 2:48 a.m.



Inv. No. 1910
Lehigh Valley Railroad
Bowmanstown, Pa.
April 24, 1934.

Description

Eastbound freight Train BNY-2 consisted of three cars and a caboose, hauled by passenger engine 2030, and was in charge of Conductor Snyder and Engineman Remaley. This train departed from Packerton, 5 miles west of Bowmanstown, at 2:42 a.m., passed Lehighton, 1.6 miles beyond, at 2:44 a.m., according to the train sheet, and was approaching Bowmanstown when it was derailed while traveling at a speed estimated to have been between 45 and 60 miles per hour.

The entire train was derailed, the engine and tender being overturned on their right sides with the rear end of the engine on track 4 and the forward end against an embankment on the south side of the tracks, 252 feet east of the point of derailment; the tender frame remained coupled to the engine and the cistern, which was torn from the frame, stopped alongside the frame to the right of track 4. One of the cars went down the embankment to the left and stopped in an upright position in the Lehigh River approximately 180 feet beyond the engine. The other two cars were practically upright and diagonally across the tracks opposite the engine, with the caboose upright opposite the tender frame and against the rear of the engine. All of this equipment was badly damaged. A string of empty hopper cars was standing on track 4, and the derailed train scraped the sides of two of these cars, slightly damaging them, and then derailed and destroyed the following seven hopper cars. The employee killed was the engineman, and the employees injured were the fireman, conductor, brakeman and flagman.

Summary of evidence

Fireman Brown stated that on the morning of the accident he had talked with the engineman before departing from Packerton yard, discussing various matters generally, and during the course of the conversation he called the engineman's attention to the instructions fixing the running time of their train to Jersey City, 119.7 miles from Packerton, at 3 hours; the engineman appeared to be normal and in good spirits. The engineman tested the brakes after coupling to the cars, but he did not know whether they were tested again after the caboose was picked up, neither did he notice any brake application after departing. The train moved to the eastbound track through the first crossover at Lehighton at about the maximum permissible speed of 15 miles per hour, while between Lehighton tower and Mahoning tower, a distance of 1.8 miles, the speed is restricted to 35 miles per hour, which speed he did not think was exceeded although it was increased after passing the latter point. Shortly after rounding

a curve west of the reverse curve at Bowmanstown the engineman eased off on the throttle but did not apply the brakes and the train continued with the engine working a light throttle. Approaching the point of accident the engineman was looking ahead and the fireman was riding on his own seatbox; the fireman observed nothing unusual until about the time the engine entered the curve on which the accident occurred, when he saw fire flying from the left driving wheels and then felt the engine rocking considerably just before it was derailed; he could not say whether the fire was caused by an application of the brakes or from some other cause, although it was his belief that the brakes were not applied. Fireman Brown further stated that he is a qualified engineman as to machinery and air brakes, but not on the physical characteristics of the road; he was not the regular fireman on this run and with the type of engine involved he was unable to judge the speed attained before the engineman partly closed the throttle, but estimated the speed at the time of the accident at 45 miles per hour.

Conductor Snyder stated that when he arrived at the yardmaster's office on the morning of the accident he received instructions from the dispatcher by telephone to notify the engineman to make as good time as possible consistent with safety, which information he conveyed to the engineman upon returning to the engine, the engineman appearing to be in normal condition in all respects. The brakes were tested on the cars before the caboose was picked up, but not afterwards, although the air was coupled to the caboose, after which he observed the position of the rear angle cock but failed to look at the gauge in the caboose to ascertain its pressure. He paid no particular attention to the speed after departing but thought that he would have noticed it if the prescribed speed of 15 miles per hour through the cross-over at Lehighton and 35 miles per hour between that point and Mahoning had been exceeded to any great extent, and was of the opinion that the train did not travel at a speed of more than 45 miles at any point after passing Mahoning. He felt no brake application, did not know whether the engineman eased off on the throttle approaching any of the curves between Lehighton and the point of accident, and was unable to estimate the speed at the time of the accident as he had just completed working on his reports. He said the train left the east end of the yard at Packerton at 2:43 a.m., but did not note the time it passed Lehighton tower and did not check the time immediately after the accident occurred. When informed that his train passed Lehighton tower at 2:44 a.m. and that the telegraph wires failed at 2:48 a.m., the distance between the tower and the point of accident being 3.36 miles, he said it would have been possible for the train to have traveled in excess of 50 miles per hour without his noticing it.

Brakeman Anthony stated that when the caboose was coupled to the train at Packerton he opened the angle cock on the rear car and thought the flagman opened the angle cock on the caboose. He then gave a proceed signal and as soon as the train started he boarded the caboose and noticed that the air gauge registered approximately 72 pounds pressure. He was familiar with the speed restriction through the cross-over at Lehighton, which he did not think was exceeded, and also the restriction between that point and Mahoning, but although he was looking out through an open window he had no idea as to how fast the train traveled between these points except that it moved at a fairly good rate of speed. He did not notice any application of the brakes or reduction in speed after passing Lehighton and there was no irregular movement of the train until the caboose lurched slightly on the reverse curve at Bowmanstown. After hearing the time that was consumed between Lehighton tower and the time of the accident he expressed the opinion that the train was traveling at a speed of 60 miles per hour or more at the time it was derailed.

Flagman Hofford stated that he assisted in coupling the caboose to the train and when he entered the caboose the air gauge showed about 70 pounds pressure. He noticed nothing unusual about the trip from the time the train left Packerton until it reached the curve on which the accident occurred, when the caboose swayed and this was followed by a severe jolt when the train was derailed. Flagman Hofford estimated that his train was traveling at a speed between 40 and 45 miles per hour after passing Mahoning, with no indication of a brake application prior to the accident; it was his opinion, however, that the train was not running at excessive speed.

Train Dispatcher Henry stated that after Train BNY-2 passed Penn Haven Junction, 10.1 miles from Packerton, he immediately asked for the conductor at Packerton yard office and told him that the train was 30 minutes ahead of schedule at Penn Haven Junction, that the running time of the train was to be 3 hours from Packerton to Jersey City, and that he was to make the best possible time consistent with safety; he held no further conversation with the conductor. The train was reported at Lehighton at 2:44 a.m. and the wires failed at 2:48 a.m., indicating that something had occurred; he immediately attempted to call Lehighton and Treichler, between which points the disturbance was apparently located, but was unable to communicate with them, and at 3:09 a.m. there was a faint noise on the telephone and he learned that the conductor was calling to report the accident and ask for assistance. It further appeared from data furnished in connection with the investigation that Train BNY-2 was a new train, making its first run from Buffalo to Jersey City, a distance of 446.6 miles, on an approximate schedule of 12 hours.

Car Inspector Leader Storm stated that after Train BNY-2 arrived at Packerton and the engine was cut off he inspected the north side of the cars and then crossed over and inspected the south side of the leading car, where he met Inspector Langkammer, who had inspected the other two cars on that side of the train. Finding no defects he returned to the head end and coupled the engine to the cars, and while the brakes were being tested he examined them and found the piston travel to be within the required limits. He then filled out an air-brake slip and delivered it to the engineman, informing him that the train was in good condition; the brakes were not tested after the caboose was coupled to the train. Car Inspector Langkammer stated that he inspected the south side of the two rear cars in Train BNY-2 and that he replaced a brake shoe on the rear car; he also examined the piston travel on these cars and found it to be within proper limits. In his judgment the brakes were thoroughly tested and were in proper working order.

Machinist Beers stated that he made an inspection of engine 2020 on April 22 and the only repairs required consisted of replacing the left no. 1 and no. 2 driving brake shoes, adjusting the brakes, and tightening the tender stay plate, and after performing this work he considered the engine to be in first-class mechanical condition. Air Brake Inspector Koons stated that he made an inspection of engine 2020 on April 23, and tested the brakes with tested gauges; the piston travel on the engine and tender were within prescribed limits and the engine was in first-class condition, with no work reported to be done on it.

Road Foreman of Engines Reichard stated that he arrived at the scene of accident about 5 a.m., April 24, and made an inspection of the engine. The throttle was in closed position with the bracket torn loose and the lever bent; the automatic brake valve was in full release position and was bent slightly upward, and the independent brake valve was in running position. He also examined the running gear of the engine and the only defects found consisted of the two back driving springs having been shoved out of place and the hangers broken, which appeared to have been a result of the accident rather than its cause. He could find no defects that could have contributed to the cause of the accident, and from the indentations on two of the hopper cars standing on track 4 it was his opinion that the engine started turning over at that point, due to excessive speed. Master Mechanic Jefferson stated that he made a joint inspection of the engine with Road Foreman of Engines Reichard and concurred in his findings as to the probable cause of the accident.

The automatic and independent brake valves, air pump and governor were removed from engine 2020 and applied to engine 2030 for purposes of test; tests were made in the presence of representatives of the railroad, the Westinghouse Air Brake Co., and this Commission, and no condition was developed to indicate that there was anything wrong with this brake equipment. The feed and distributing valves were not available for test on account of having been destroyed in the accident.

An examination of the track for a considerable distance west of the point of accident was made by the Commission's inspectors and no irregularities or other conditions were found that could have contributed to the accident. Supervisor of Track Reilly said he had carefully examined the track and that the only mark on the rails was a light mark on the south or outside rail of the curve which extended diagonally across the top of the rail for a distance of 14 feet 8 inches to where it passed off the outer edge. At the time of the inspectors' examination, however, this mark had been obliterated by trains passing over it. Twenty-five feet east of the mark on the rail there was a mark on the end of a tie, 20 inches outside of the gage line of the high rail, and the end of this tie, as well as the ends of several ties east of it, was badly splintered, while from this point eastward the track was shoved out of line to the north or toward the inside of the curve. No marks were found on the ties on the gauge side of the north rail opposite these marks. Measurements of the track at the point of derailment showed that the curvature was 7° 37', the superelevation was 5-5/8 inches, and the gage was uniform at 4 feet $8\frac{3}{4}$ inches. Based on this curvature and elevation, according to information furnished by Mechanical Engineer Cantley, the overturning speed for the class of engine involved would be 65 miles per hour.

At a point 38 feet west of the first mark on the rail, a hopper car on the storage track had definite scrape-marks on the top angle of the car, while the next car on the east had its side bent inward, and beyond this car the seven following cars were derailed to the north. An inspection of the engine showed that its right side was badly damaged and the cab and most of the appurtenances were torn off, but the engine and trailer trucks remained intact with no marks on the engine-truck wheels. The driving wheels on the right side and the right trailer-truck wheel had well-defined marks around the entire treads of the wheels which varied from $\frac{3}{4}$ inch to 2-3/8 inches from the throat of the flange, these marks indicating that the wheels had been running on the rail while the engine was in process of overturning; there were also abrasions on the flanges of these wheels. No marks were found on the wheels on the left side of the engine. It was thought that there were marks on the

outside edge of the high rail, but no positive statement to this effect could be made. Engine 2020 is of the 4-6-2 passenger type, with a driving wheel base of 13 feet 8 inches and a total wheel base of 35 feet 7 inches. This engine was turned out of the shops on August 23, 1933, after having received Class 3 repairs.

Conclusions

This accident was caused by excessive speed on a sharp curve.

According to the statements of the surviving members of the crew, the train passed through the cross-over at Lehighton at a speed of not more than 15 miles per hour and did not travel faster than the maximum permissible speed of 35 miles per hour between that point and Mahoning, this speed being increased to approximately 45 miles per hour after passing the latter point, although none of these employees appeared to have been paying particular attention to the speed. Conductor Snyder later said that the speed might have been in excess of 50 miles per hour after passing Lehighton, and Brakeman Anthony said that it could have been 60 miles or more per hour at the time of the accident. The distance between Lehighton tower and the point of accident is 3.36 miles and the records indicate that the train traveled this distance in 4 minutes, or at an average speed of about 50 miles per hour. If the speed restriction between Lehighton and Mahoning was complied with, then the train must have traveled at materially higher speed east of that point. The best evidence, however, to indicate that the speed was excessive was that which was obtained from examination of the track and equipment. This examination failed to disclose any defective condition that could have contributed to the cause of the accident, but it did reveal that the only marks on the track at the point of derailment were on the high or outside rail of the curve and on the outer ends of the ties east of this mark. There were no marks of any kind on the low rail, or between the rails, indicating conclusively that the engine turned over from centrifugal force without first being derailed, and thus accounting for the marks on the coal cars standing on the storage track opposite the point of accident; marks entirely around the circumference of wheels on the right side of the engine also indicated that the engine had been tilted heavily to one side while the wheels on that side were still on the rail.

The brakes had been inspected and tested before the train left Packerton, and a test of the brake apparatus removed from the engine subsequent to the accident disclosed that it was in working order, while Engineman Remaley appeared to have been

in normal condition before starting the trip, and must have been alive very shortly before the accident in view of the fact that Fireman Brown observed him easing off on the throttle about 25 or 30 seconds before the accident occurred. Under these conditions it is impossible to say why he failed to reduce the speed of his train in compliance with the 40-miles per hour speed restriction in effect on this curve although it is noted that this was only a 3-car freight train which was being hauled by a passenger-type engine and the engineman had received instructions to make as good time as possible consistent with safety.

Respectfully submitted,

W. J. PATTERSON,

Director.