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INTERSTATE COMMERCE COMMISSION

REPORT OF THE CHIEF OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE PENNSYLVANIA RAILROAD NEAR MANHATTAN TRANSFER, N J, ON OCTOBER 28, 1921

NOVEMBER 21, 1921

TO THE COMMISSION

On October 28, 1921, there was a rear-end collision between two passenger trains on the Pennsylvania Railroad near Manhattan Transfer, N J, which resulted in the injury of 38 passengers 4 Pullman employees, and 4 employees of the railroad The investigation of this accident was conducted in conjunction with representatives of the New Jersey Board of Public Utility Commissioners

LOCATION AND METHOD OF OPERATION

This accident occurred on that part of the New York Division extending between Manhattan Transfer and the Pennsylvania station in New York City, a distance of 8 8 miles, at a point about 1 mile east of Manhattan Transfer Approaching this point from the east the track is tangent for a distance of nearly 8,600 feet, followed by a 30-minute curve to the right 2 828 feet in length, the accident occurring on this curve at a point about 900 feet from its western end The variations in grade are slight, it is practically level in the immediate vicinity of the point of accident

In the vicinity of the point of accident this railroad is a double-track line, over which trains are operated by time-table, train orders, and an automatic block-signal system, both tracks being signaled for movements in both directions The automatic signals are of the three-position, upper-quadrant semaphore type, the night indications being red, yellow, and green, for stop, caution, and proceed, respectively Light signals are used in the tunnel An automatic train-control system of the ground mechanical-trip type is installed in part of this territory All electric motors operated over this line are equipped with automatic train-control trip-arms and valves, and track trips are installed in connection with signals in the tunnel at the western portal of the tunnel and at the approaches to the drawbridge over Hackensack River, approximately 2½ miles east of Manhattan Transfer The accompanying diagram shows the block-signal

and train-control installations between the western portal of the tunnel and the point of accident

This accident occurred on the westbound main track Westbound automatic signal 849 is located 5,076 feet east of the point of accident Automatic signal 843 is located 2,410 feet west of signal 849, this is a two-arm signal, the upper arm having three positions while the bottom arm is fixed Interlocking signal 64–L is located 2,395 feet west of signal 843 and 271 feet east of the point of accident Signal 64–L is operated from S interlocking station, located a short distance east of Manhattan Transfer Interlocking signal 54–L is located 711 feet west of signal 64–L The accident occurred at about 12 30 a m at which time a heavy fog prevailed, which rendered the observation of signal indications difficult

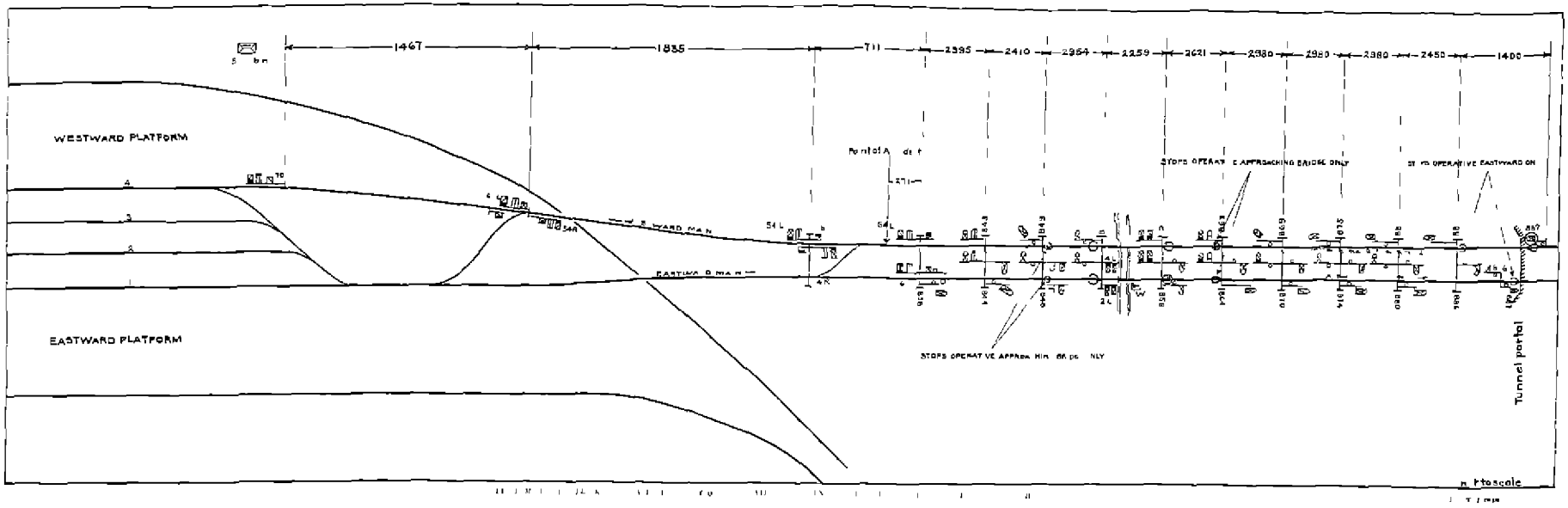
Westbound passenger train No 701 consisted of 1 baggage car and 4 coaches, hauled by motor 17, and was in charge of Conductor Martin and Engineman Trowell It left New York at 12 01 a m, on time, passed W block station, approximately 1¾ miles from the point of accident, at 12 11 a m, on time, and stopped at interlocking signal 54–L, which was in the stop position After standing at this point for a period variously estimated by the crew to have been from 4 to 12 minutes, the rear end of this train was struck by train No 103

Westbound passenger train No 103 consisted of 12 Pullman sleeping cars, hauled by motor 11, and was in charge of Conductor Forwood and Engineman Drotar It left New York at 12 15 a m, on time, passed W block station at 12 25 a m, on time, passed signal 849 at caution, signal 843 at stop, the flagman of train No 701, and signal 64–L a stop, and collided with the rear end of train No 701 while traveling at a speed variously estimated by the crew at from 10 to 25 miles an hour

Motor 17, of train No 701, broke away, being separated from the first car in the train, a distance of about 2 car-lengths The forward truck of the baggage car in this train was derailed and slight damage sustained by all of the cars Motor 11, of train No 103, was considerably damaged and the forward truck derailed Train No 103 broke in two between the first and second cars, and between the tenth and eleventh cars, five cars in this train were slightly damaged

SUMMARY OF EVIDENCE

Engineman Trowell, of train No 701, said his train maintained schedule speed until in the vicinity of signal 869, about 3 miles east of the point of accident, on account of the dense fog, he failed to see the indication of this signal, and he said he then reduced speed and approached signal 863, one-half mile farther west, prepared to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stop This signal was displaying a clear indication and the train then proceeded until it was stopped at signal 54–L, the indication of which he was able to see a distance of only 3 or 4 car-lengths After stopping, he sounded the whistle signal for the flagman to protect the train, when ready to proceed, he sounded the signal recalling the flagman, shortly after which he heard the explosion of two torpedoes and felt the shock of the collision He thought the accident occurred about 1½ minutes after the recall signal had been sounded The statements of Helper Schultz practically corroborated those of Engineman Trowell

The statements of Conductor Martin, Head Brakeman Boehm, and Flagman Sloane, of train No 701, indicated that their train had been running slower than usual, although their opinions did not agree as to between what points it had been running slowly According to their statements, when the train stopped at signal 54–L, the flagman got off the rear end of the rear car, lighted a fusee, and started back to protect his train, the conductor came back through the train and asked the head brakeman, who was then on the rear platform, if the flagman was back, the conductor then got off and in company with the head brakeman started out for the purpose of making sure that the flagman was going back, the fog being so thick they could not see the flagman The statements of these employees do not indicate definitely whether the conductor went back any material distance, although he himself said he went back as far as a burning fusee, which he estimated to have been about 6 car-lengths from the rear of his train It appears, however, that the head brakeman went back a greater distance, and that either he or both he and the conductor called to the flagman and told him to keep going until recalled, and that these instructions were heard by Flagman Sloane The head brakeman thought the flagman was back about 8 or 10 car-lengths when he called to him Flagman Sloane's statement as to the location of the fusee nearest the train does not agree with the estimate of the conductor, for he said he dropped it about 1 car-length from the train According to the flagman's statement of his further movements, after dropping this first fusee he continued back and dropped a second fusee at a point about 7 or 8 car-lengths from the train, and about 30 feet beyond this point put down one torpedo and 50 feet farther on put down another torpedo Flagman Sloane said he continued to go back and when recalled he dropped a third fusee and had started to return when he felt the vibration of the roadbed caused by the approach of train No 103, after walking toward his train a distance of 60 or 70 feet, he realized that the approaching train was on the same track, heard the explosion of the torpedoes, and jumped from the track He also said he swung a lantern

whether red or white he did not know, and called to the crew of the motor, at the same time throwing a lantern at the cab window as the motor passed him Flagman Sloane estimated the speed of train No 103 to have been at least 20 miles an hour, and said he did not notice any indication of the air brakes having been applied When the train stopped he was within about one-half car-length of its rear end

Conductor Martin thought his train had been standing 6 or 8 minutes when the accident occurred, Baggagemaster Bresnahan estimated this period to have been 8 minutes, while Flagman Sloane thought train No 103 passed him 5 or 6 minutes after he had started back to flag Helper Shultz estimated this period to have been about 10 minutes, while Engineman Trowell estimated it to have been 12 minutes

H C Jacobus, a brakeman deadheading on train No 701, said he went out on the platform of the rear car when the train stopped and saw that Flagman Sloane had gotten off, lighted a fusee, and was on his way back to flag, carrying the fusee with him He thought train No 701 had been stopped about 11 minutes when the accident occurred

Engineman Drotar, of train No 103, said he reduced speed at Hackensack River drawbridge, near W block station, to about 30 miles an hour and did not again use power He saw the clear indication which was displayed by signal 855, the first signal west of the drawbridge, and said the speed of his train when passing this signal was also about 30 miles an hour The caution and stop indications of the two succeeding signals, 849 and 843, were missed entirely by Engineman Drotar He said that when he concluded he had missed a signal, by which time his train probably was some distance west of signal 849, he made a brake-pipe reduction of from 8 to 12 pounds and was about to make a second reduction when he saw a fusee, and as the motor passed over it, one torpedo was exploded He estimated the speed of his train at this time to have been not more than 10 or 12 miles an hour, and said he at once applied the air brakes in emergency He saw signal 64–L, which was displaying a stop indication as his train passed it Engineman Drotar said the fusee and torpedo were 1½ car-lengths east of signal 64–L, saying he was able to fix the definite location of the fusee by the fact that after the accident he went back and found the fusee under the fourth car of his train, it was not burning when found Engineman Drotar further said that the proper thing for him to have done when he found he had missed a signal was to stop and then proceed cautiously until he could determine his location

The statements of Helper Dean, of train No 103, as to the observance of the block-signal indications agreed with those of En-

gineman Drotar except that he said he also failed to see signal 64–L While his estimate as to the speed of the train when passing signal 855 practically agreed with that of the engineman, he said the air brakes were applied only a short time before the fusee was seen, also that two torpedoes were exploded, these appearing to be within a foot or two of each other Helper Dean estimated the speed at the time of the collision to have been 10 or 12 miles an hour After the accident he found the marks of torpedoes and one fusee about 3 car-lengths from the point of accident, he found no other fusees under the entire length of his train

The statements of Conductor Forwood, Head Brakeman Townsley, and Flagman Boyer, of train No 103, were to the effect that after the reduction in speed at the drawbridge to 30 miles an hour, no other application of the air brakes was felt until the emergency application a few seconds before the accident occurred The first two employees thought the speed at the time was about 20 or 25 miles an hour, while Flagman Boyer, who had ridden on the rear platform of the rear car from the drawbridge to the point of accident, did not think there had been any material change in the speed after passing the drawbridge None of these employees heard any torpedoes explode, although the conductor was riding in the front vestibule of the second car Head Brakeman Townsley said he got off the rear end of the fifth car and found a burning fusee under the car, with about 2 inches of the fusee unburned Flagman Boyer got off to flag as soon as the train stopped, but as he did not look forward he did not see anything of the flagman of train No 701, he did not encounter any fusees on his way back to flag

Assistant Road Foreman of Engines Mayo said that on this particular night he made three trips to Manhattan Transfer and the fog was so thick that they had to stop, get off, and look for the signals

H E Stump, supervisor of telegraph and signals, said that with a train between signals 54–L and 64–L, as was the case with train No 701 in this instance, signals 64–L and 843 would display stop indications, while signal 849 would display a caution indication Mr Stump said these indications were observed within less than an hour after the accident, and that men were stationed at each signal location for 48 hours afterwards for the purpose of observing the operation of the signals, the signals operated properly throughout this period

CONCLUSIONS

This accident was caused by the failure of Engineman Drotar, of train No 103, properly to observe and be governed by automatic block-signal indications, and by the failure of Flagman Sloane, of train No 701, properly to protect his train by flag

Engineman Diotai admitted that the last block-signal indication seen by him was the clear indication of signal 855 He therefore permitted his train to pass signals 849 and 843 without observing their indications As soon as he realized that he had passed a signal without seeing its indication, Engineman Diotar should have brought his train to a stop and then have proceeded at a very low rate of speed until he observed the indication of the succeeding signal Had he done so, he would no doubt have been able to stop after exploding the torpedoes, or would have seen signal 64–L, the flagman's lantern or fusee, or the markers on the rear end of train No 701 in time to avoid the collision

As nearly as can be estimated, the accident occurred at about 12 30 a m Train No 701 passed W block station at 12 11 a m This block station is less than 2 miles from the point of accident, but assuming this distance to be a full 2 miles, had train No 701 been operated at a speed of only 10 miles an hour for the entire distance it would have stopped at signal 54–L at 12 23 a m , still leaving the flagman 7 minutes in which to protect his train Flagman Sloane had not thrown off fusees or provided any other protection for his train prior to its arrival at signal 54–L, and it therefore is evident that he failed properly to protect his train in at least one of two ways If his train ran at a speed of only 10 miles an hour between these two points it was in danger of being overtaken by another train, and he should have provided the protection required by rule under such circumstances by throwing off lighted fusees On the other hand, if his train traveled at a higher rate of speed than 10 miles an hour, as is believed to have been the case, and accordingly reached signal 54–L before 12 23 a m , he probably had 10 minutes or more in which to provide proper protection In view of the unfavorable weather condition prevailing, as well as the instructions given by Conductor Martin, he should have made particular effort to go back as far as possible

Flagman Sloane's statement that after placing torpedoes on the rail he continued to go back, and when recalled dropped another fusee, is not supported by other evidence Engineman Diotai said a torpedo was exploded as he passed over a lighted fusee about 1½ car-lengths east of signal 64–L, Helper Dean after the accident located the marks of two torpedoes and the remains of a fusee about 3 car-lengths from the point of accident Flagman Sloane's statement that he heard the explosion of the torpedoes, and then jumped from the track, indicates that instead of going back until recalled he walked in toward his train after putting down the torpedoes, but when questioned as to this he said he probably heard the explosion of the torpedoes after having jumped from the track Conductor

Martin's estimates as to the location of the first fusee varied in different parts of his testimony between 5 and 12 car-lengths, when questioned in regard to these conflicting estimates he determined upon 6 car-lengths as the distance Head Brakeman Boehm estimated this fusee to have been 5 car-lengths from the rear of the train

Had Flagman Sloane gone back as far as possible in the time available after his train stopped, it is believed he would have been able to warn the engine crew of train No 103, by means of fusees and torpedoes, in time to have averted the accident notwithstanding their failure to observe block-signal indications

Helper Dean, of train No 103, was also at fault for his failure to observe signals and to warn the engineman that they had passed signal locations without seeing the indications

Terminal time-table No 5, dated September 25, 1921, shows 87 westbound and 89 eastbound scheduled trains a total of 176 trains daily, several of these trains do not run on Sunday The block sheet for W block station shows that during the 24-hour period beginning at 12 01 a m , October 28, 1921, there was a total of 234 trains passing this station in both directions on both tracks

The signal system on this line was put in service in 1910 when the tunnel was opened for traffic It furnishes all the protection that can be provided by modern railroad signaling, and investigation indicated that the signal system is well maintained and the apparatus functioned as intended Automatic train-stop devices were placed in service at the same time Some of these devices are located on the open roadway, at the western portal of the tunnel and at Hackensack drawbridge, and the investigation did not disclose that any difficulty had been experienced in their operation No explanation was furnished of the reason for installing these stop devices in connection with certain but not all of the signals in this territory Signal Supervisor Stump stated that if an automatic stop had been installed in connection with signal 843, train No 103 undoubtedly would have received an automatic brake application at that point and the accident would have been prevented The function of a device of this character is to stop a train automatically in case the engineman for any reason fails to observe a stop signal indication, had these devices been installed in connection with the signals involved in this accident, train No 103 undoubtedly would have been stopped automatically before reaching the point of accident, and the collision would have been averted

As previously noted all motors operated in this territory are equipped with the automatic train-stop apparatus, and the extension of the system can be made by installing additional track devices To prevent the recurrence of accidents of this character, it is recom-

mended that the installation of the automatic train-stop system be extended to cover the entire line between New York City and Manhattan Transfer

All of the equipment of the trains involved was of steel construction, and no serious damage was sustained by any of the cars, although the shock of collision was sufficient to damage 10 of the cars, while the motor hauling the first train broke away from its train being separated from the first car a distance of about 2 car-lengths Had any one of these cars been constructed of wood, it is probable that it would have been badly damaged, if not destroyed, and that there would have been loss of life

At the time of the accident the crews of the trains involved had been on duty 2 hours or less they had been off duty for varying periods, none of which involved any violation of the hours-of-service law

Respectfully submitted

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Chief, Bureau of Safety

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