INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY CONCERNING AN ACCIDENT ON THE ERIE RAILROAD NEAR BINGHAMTON, N.Y., ON SEPTEMBER 5, 1933.

October 7, 1933.

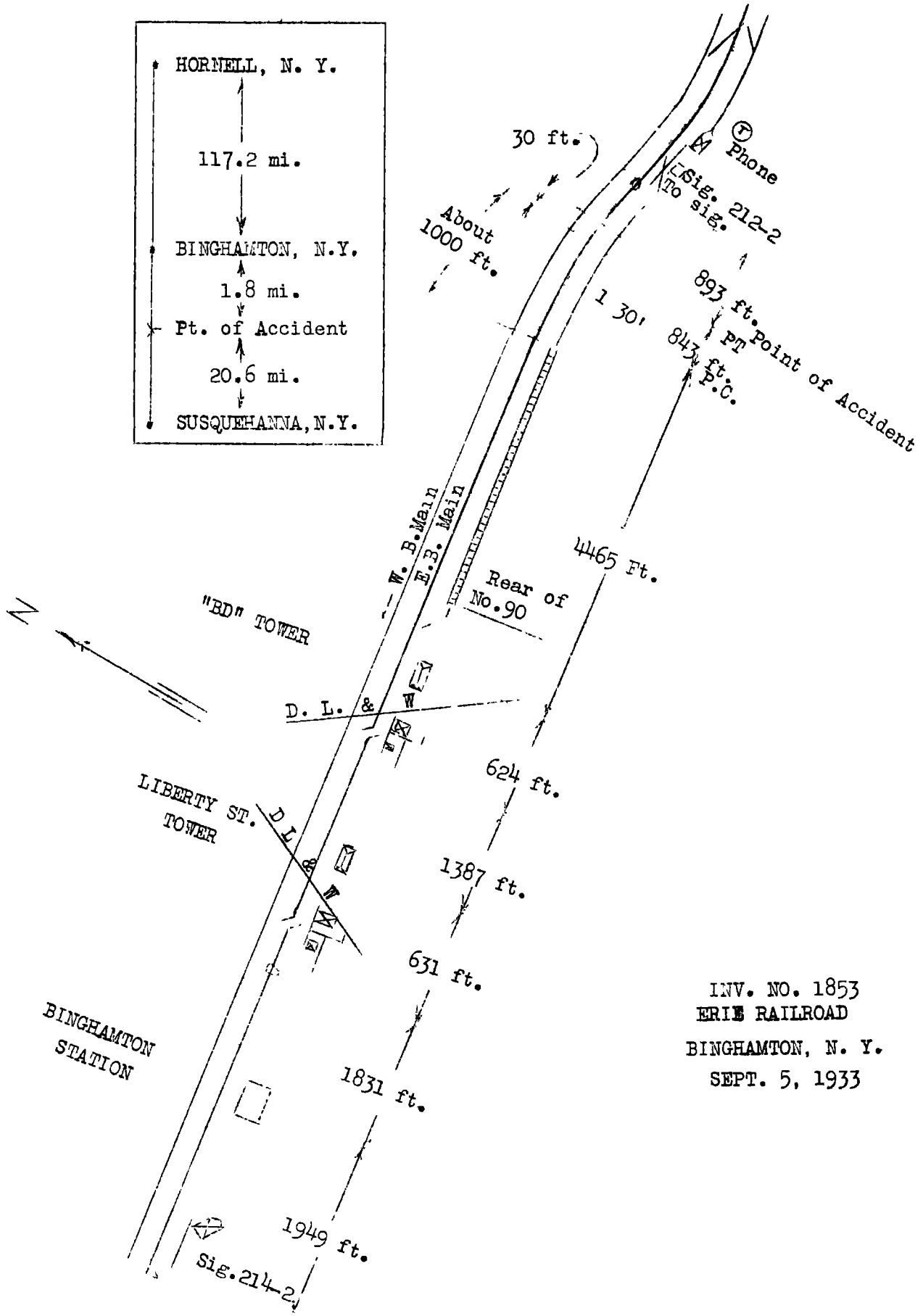
To the Commission:

On September 5, 1933, there was a rear-end collision between a passenger train and a milk train on the Erie Railroad near Binghamton, N.Y., which resulted in the death of 14 passengers, and the injury of 31 passengers and 1 employee. The investigation of this accident was made in conjunction with representatives of the Public Service Commission of New York,

Location and method of operation

This accident occurred on the main line of the Susquehanna Division, which extends between Hornell, N.Y., and Susquehanna, Pa., a distance of 139.7 miles. This is a double-track line over which trains are operated by time table, train orders, and an automatic block-signal system, supplemented by an automatic train stop of the intermittent-induction type. The point of accident was nearly 2 miles east of the passenger station at Binghamton; approaching this point from the west, beginning at the center line of the station, the track is tangent for a distance of 8,938 feet, followed by a 1°30 ' curve to the right 843 feet in length, and then tangent track extending to the point of accident, a distance of 30 feet, and for a short distance beyond that point. The grade eastward from the station is slightly descending, the maximum being 0.24 percent, and it is then slightly ascending for a distance of about 2,300 feet to the point of accident.

The signals involved, named in order from west to east, were automatic block signal 214.2 and the interlocking home signals at Liberty Street and BD Towers, these signals being located 11,759, 7,980, and 5,962 feet, respectively, west of the point of accident, and automatic block signal 212.2, located 893 feet east of the point of accident. The automatic signals are of the 1-arm, 3-position, upper-quadrant semaphore type, the night indications being red, yellow and green, for stop, approach and proceed, respectively. On the same mast with signal 212.2, and mounted below it, is a 3-position, electrically-operated train-order signal, and the control of the automatic signal is so arranged that its indications will not be more favorable than those displayed by the train-order signal. The interlocking home signals are of the 2-arm semaphore type; the upper arms are of the 3-position,



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upper-quadrant, semi-automatic type, displaying the same night indications as the automatic signals, while the lower arms are non-automatic, lever controlled calling-on signals operating in two positions, the night indications being red and yellow, for stop and proceed at restricted speed, respectively. These calling-on signals were installed for the purpose of advancing a train into an occupied block and for authorizing diverging movements. On account of braking distance of only 2,018 feet between the home signals at Liberty Street and BD Towers, an over-lap has been provided so that automatic signal 214.2, west of Binghamton station, will not display a more favorable indication than approach unless the home signal at Liberty Street is in the proceed position.

The automatic train stop operates in conjunction with the way-side signals, the inductors being located approximately 70 feet in the rear of each signal; the device will cause the train brakes to be applied when the way-side signal is in the stop position unless the engineman operates a forestalling lever in the cab of his engine.

There is a long siding on the south side of the east-bound track, this siding beginning just east of BD Tower and extending for a considerable distance east of signal 212.2, with a crossover connection with the east-bound track at a point a short distance east of the signal. At the time of the accident, the rear portion of an east-bound freight train, consisting of a caboose and 82 cars, was standing on this track, the head car being probably about 1,000 feet west of the point of accident.

The weather was clear and dark at the time of the accident, which occurred about 7:23 p.m.

Description

East-bound freight train no. 90 consisted of 92 cars and a caboose, hauled by engine 3370, and was in charge of Conductor Norton and Engineman Griffin. Before arriving at Binghamton the crew of this train had received a message instructing them to pull into the siding east of BD Tower, and when passing the station at Binghamton, at 6:59 p. m., according to the train sheet, a message was handed to the engine crew telling them that switch engine 78 would bring out to them the cars to be picked up at Binghamton and also take from them the Binghamton cars which were to be set out. This train passed BD Tower, according to the train sheet, at 7:01 p. m.. and pulled in on the eastward siding.

Switch engine 78, in charge of Foreman Gaffney, with 30 cars to be delivered to train no. 90, followed that train on the east-bound track from Binghamton, and after train no. 90 had cleared on the siding, engine 78 proceeded on the main track to the cross-over east of signal 212.2. The work of setting out the 10 cars for Binghamton and picking up the 30 cars brought out by engine 78 was in progress when train no. 8 approached on the east-bound track and was stopped by the flagman of the

East-bound train no. 8 consisted of 3 express cars, 1 mail car, 1 combination baggage car and coach, 2 coaches, and 1 parlor car, hauled by engine 2916, and was in charge of Conductor Burlingame and Engineman Grantier. The first, second, third, fourth and seventh cars were of steel construction, while the fifth, sixth and eighth cars were of steel-underframe construction. According to the train sheet, train no. 8 arrived at Binghamton at 7:03 p. m., one minute late, departed at 7:16 p. m., one minute late, and passed BD Tower at 7:18 p. m., receiving at the latter point an approach indication on the top arm of the home signal, indicating that at that time automatic signal 212.2 was in stop position. Shortly afterwards train no. 8 was flagged by the flagman of switch engine 78, and was brought to a stop with its rear end, as nearly as could be determined, 893 feet west of signal 212.2. About one minute after having been brought to a stop the rear end of the train was struck by train third no. 2.

A milk train is usually operated on this division as a section or sections of passenger train no. 2, which is due to leave Binghamton at 1:52 p. m., and it was one of these sections, being operated as train third no. 2, which was involved in the accident; it consisted of 6 milk cars, 1 express car, 11 milk cars and a coach, all of steel under-frame construction and in the order named, hauled by engine 2929, and was in charge of Conductor Shea and Engineman King. This train was stopped at signal 214.2, train no. 8 being at the station, and then proceeded slowly and was stopped a few car lengths behind train no. 8, where it remained until after that train had departed. Train third no. 2 then proceeded, passed Binghamton station at 7:18 p. m., according to the train sheet, two minutes behind train no. 8, received an approach indication at the home signal at Liberty Street, was given the calling-on arm at BD Tower, indicating that the block was obstructed and that the train was to proceed at restricted speed, passed BD Tower at 7:21 p. m., according to the train sheet, three minutes behind train no. 8, and was approaching signal 212.2 when it collided with the rear end of train no. 8 while traveling at a speed believed to have been between 15 and 20 miles per hour.

The front end of engine 2929 crushed the superstructure of the parlor car for a distance of several feet, and the front end of the second car from the rear overrode the underframe of the third car from the rear, resulting in the rear of the latter car being telescoped for a distance stated by the shop superintendent as 47 feet; practically all of the casualties occurred in this car, which was practically destroyed. Engine 2929 was only slightly damaged; the express car in train third no. 2 was destroyed but only slight damage was sustained by three other cars in the train. The employee injured was the porter in the parlor car of train no. 8.

Summary of evidence

General Yardmaster Reap had been informed by the dispatcher that train no. 90 would arrive about on the time of train no. 8, and he told the dispatcher he would run the train to BD Tower

and put it on the eastward siding at that point. He then instructed Yardmaster McAndrews to have the yard crew receive the Binghamton cars to be set out by train no. 90 and take out to that train the 30 cars which were to be picked up; before going off duty, he also told the yardmaster to notify the engineman of train no. 8 to look out for train no. 90 doing work at the east end of BD siding. General Yardmaster Reap said train no. 90 passed the station at Binghamton at 6:55 p. m., whereas the train sheet time was 6:59 p. m., and said he considered that there was time enough to do the work at the east end of BD siding without delaying train no. 8, on the assumption that there was a period of 20 minutes available for that purpose, or between 6:55 p. m., and the departing time of train no. 8 from Binghamton, which is 7:15 p. m.

Yardmaster McAndrews said he received the instructions from the general yardmaster and that he told Switch Foreman Gaffney that train no. 8 was on time, also telling the engineman of train no. 8 to watch out for the yard engine working with train no. 90; he said he had frequently made similar movements in the past. In this particular case, he knew that the time would be short, but considered that it could be done without delaying train no. 8; he thought that the yard engine started from the freight house about 6:55 p. m., or possibly a little later.

Statements by the engineman and two brakemen of train no. 90 were to the effect that they had coupled to the cars taken out to them by the switch engine and were backing them in on the siding when the collision occurred. The conductor and flagman were in the caboose, the markers on which had been turned so as to display green to the rear when the train first pulled in on the siding. The flagman thought train no. 8 passed the caboose at a speed of about 20 miles per hour and that train third no. 2 passed about 3 minutes later, traveling at a speed of about 25 miles per hour. The engineman, conductor and flagman said that the movements being made in connection with picking up and setting out cars were not unusual, the conductor saying it had been done before when close ahead of first-class trains.

Switch Foreman Gaffney, of switch engine 78, said that his engineman had whistled out a flag in order to protect the movements being made, and that the flagman was located about 200 yards west of signal 212.2 when he flagged train no. 8. Foreman Gaffney did not remember that he had ever before delayed train no. 8 while making similar movements. Switchman Noonan, who was doing the flagging for engine 78, said he rode down to the east end of BD siding on the rear car, got off and walked back until he had a clear view of the

straight track west of the curve. He flagged train no. 8 as it approached, boarded the step at the gangway, and told the engineman that they had cars for train no. 90 and to watch out, after which he got off and waited until train no. 8 pulled ahead toward the signal and stopped, at which time its rear end was practically opposite where he was standing. Switchman Noonan then walked around the rear of the train to the west-bound track, on which track his own engine would return to Binghamton, and as he did so he saw the flagman of train no. 8 starting back to flag. He did not pay any further attention to the flagman, but began to walk eastward at an ordinary gait, and had reached a point about opposite the head end of the seventh car in train no. 8 when he looked around and saw train third no. 2 approaching. Switchman Noonan did not see the flagman of train no. 8 again after first meeting him while walking around the rear of that train, and estimated the interval between the time at which train no. 8 stopped and the time of the collision to have been about one minute.

Engineman Grantier, of train no. 8, said Yardmaster McAndrews told him about the work being done at the east end of BD siding. The home signal at Liberty Street went to the clear position before his engine passed it, while an approach indication was received on the home signal at BD Tower, indicating that at that time signal 212.2 was in stop position. As he passed this approach signal he operated the forestalling lever of the train-stop device and proceeded at reduced speed, being flagged when he reached the western end of the curve; he further reduced speed sufficiently to enable the flagman to get on the bottom step of the gangway and the flagman told him that cars were being picked up by train no. 90, after which he proceeded and finally brought his train to a stop at a point he estimated to have been about 500 feet west of signal 212.2, at which time he whistled out a flag. Engineman Grantier did not think he had been stopped over one minute when the collision occurred; the force of the impact moved his engine ahead 4 or 5 feet; the train was standing with the brakes released, and the independent brake on the engine **was not** applied.

Fireman Washburn of train no. 8, confirmed the statements of his engineman as to the signal indications received at Liberty Street and BD Tower, and estimated the speed to have been 20 miles per hour at Liberty Street and 25 miles per hour when passing BD Tower. He also said that his train reduced speed so that the flagman could get on, after which it was stopped with the engine five or six car lengths west of signal 212.2. According to Fireman Washburn, his engineman whistled out a flag just as he was coming to a stop, and he estimated that the time interval between stopping and the time of the collision did not exceed one and one-half minutes.

Baggagemaster Williams, of train no. 8, said his train proceeded slowly after passing BD Tower, estimating that the speed did not exceed 5 or 6 miles per hour, and the train finally stopped at the end of the tangent track and at once started ahead before he could get to the door of the baggage car; the train pulled ahead slowly towards signal 212.2, the engineman whistling out a flag about the time of stopping at that point. After looking ahead and seeing what was going on, Baggagemaster Williams looked back toward the rear and saw the flagman get off and start back to flag, and on looking west of the flagman he saw the headlight of the following train. According to his statement, the flagman was giving stop signals with his red and white lanterns, and the baggagemaster heard these signals acknowledged.

Head Brakeman Donovan, of train no. 8, said his train made about normal speed until it reached BD Tower, and from that point eastward its speed was less then 20 miles per hour, the train entering the curve west of the point of accident at a speed of 5 or 10 miles per hour. He did not recall that his train made more than one stop, and this was at a point 500 or 600 feet west of signal 212.2, at 7:22 p. m. He got out on the ground and saw Flagman Morris running back to flag and also saw the headlight of the following train; Head Brakeman Donovan thought the flagman went back as far as was possible in the period of about one minute before the accident occurred.

Conductor Burlingame, of train no. 8, said that while standing at the station he saw a train back of him which he supposed was the milk train. His own train left Binghamton between 7:15 and 7:16 p. m., and moved at less than the usual rate of speed, although he did not know the reason why. The train finally came to a stop near signal 212.2 and as it did so, he heard the engineman whistle out a flag. At this time Conductor Burlingame was in the head end of the sixth car collecting transportation; he went out to the front vestibule, looked back on the engineman's side, saw the flagman getting off with red and white lanterns, and then looked ahead and saw that the automatic signal was in stop position. The conductor then returned inside the car and had collected one more ticket when the accident occurred, which in his opinion was not more than 45 seconds after his train stopped. Conductor Burlingame further stated that when the flagman got off, he appeared to start back on the

run, and in talking with him after the accident the flagman said he got back as far as possible, but did not say how far back he went.

Flagman Morris, of train no. 8, said train third no. 2 stopped at the automatic signal west of Binghamton, then pulled ahead, was flagged by him, and finally came to a stop about three or four car lengths from the rear of his own train, while at Binghamton station and remained there about 10 minutes before train no. 8 departed, at 7:16 p. m. When his train passed BD Tower, Flagman Morris was standing on the rear platform, but he afterwards went inside and sat down in the rear seat, where he became engaged in making out reports, and he did not know whether his train was making the usual speed; when the brakes were applied preparatory to making the stop west of signal 212.2 he started for the rear platform, the train being stopped by the time he reached it; the engineman whistled out a flag as the train stopped. Flagman Morris picked up his red and white lanterns, but did not take any fusees as he was in a hurry and did not want to encounter the delay of even a few seconds which might result in hurriedly reaching for a fusee, one of which was in a corner of the vestibule near the diaphragm, while the fusee case was suspended from the tail gate; however, some torpedoes were fastened to one of his lanterns. Flagman Morris said he got off very shortly after his train stopped, heard train third no. 2 coming and saw the reflection of its headlight, and began to run almost immediately after getting off; while running he heard the engine working steam. He did not know whether his stop signals were answered, or how far back he went, before the engine passed him, but about the time the engine passed him he saw fire flying from the wheels and he estimated that the speed of the train at that time was about 20 or 25 miles per hour. When asked whether he did not think it would have been desirable to throw off a fusee before his train stopped, knowing that the milk train was following him closely, Flagman Morris said that the train following him was passing a calling-on signal and had to acknowledge in order to get by it, and that he did not think it necessary to go back a mile in order to flag it; he also stated, however, that it was not up to him to depend on the signals for protection. When questioned subsequently on this point, the rule was read relative to the use of fusees when moving under circumstances in which his train might be overtaken by a following train, and Flagman Morris said in reply that this was a restricted area, meaning that his train was in territory protected by interlocking signals rather than by automatic signals, and therefore that the following train would be running under restrictive signal indications, and he said that had he not been in this territory he would have thrown off a fusee long before reaching the point where his train stopped, but in view of the territory in which his train was operating he did not think it necessary to throw off a fusee as he did not think his train was going to stop, also that under the rules the engineman of the following train was required to be under control, prepared to stop almost immediately, and that had he been running in this manner, Flagman Morris would have

had time enough to get back around the curve. When questioned a third time concerning his failure to use a fusee before his train stopped, Flagman Morris emphasized the fact that he did not know that his train was going to stop, saying that he had worked on train no. 90 when it would delay train no. 8 momentarily and then the signal would clear up and the train would proceed, and he thought this would be the case on the night of the accident.

Conductor McLaughlin, who was deadheading on train no. 8 preparatory to handling that train eastward from Susquehanna, was riding near the rear end of the fifth car in the train. According to his statements, train no. 8 made only one stop after leaving the station; he looked at his watch and the stop was made between 7:20 and 7:21 p. m.; the train had not been running at its usual rate of speed before this stop, and he estimated that after stopping, the engine was located about 150 feet or more west of signal 212.2. In his opinion, the train had been stopped about 45 seconds when he felt the shock of the collision; that after getting off the rear end of the car he looked at his watch and it was then 7:22 p. m.; he had compared time with a standard clock a short time previously and found that his watch was 15 seconds slow. It further appeared from his statements that when he first looked to the rear after getting off the train he saw what appeared to be the flagman of train no. 8 and at that time the flagman was five or six car lengths west of the engine of train third no. 2. Conductor McLaughlin thought the flagman of train no. 8 had gone back as far as possible in the time available. After making sure that the west-bound track was protected, he stepped over to the eastward siding and looked westward to see if protection was being provided for the rear end of train third no. 2; he was able to see what he thought was a flagman and at least two white lanterns and one red lantern at the rear end of that train, indicating that the view across the curve was unobstructed for at least the length of train third no. 2, or more than 900 feet.

Engineman King, of train third no. 2, said he closed up on train no. 8 while it was standing at the station at Binghamton and waited 8 or 10 minutes for it to proceed; he then called in his flag and started to follow train no. 8, not having any stop to make at the station. The home signal at Liberty Street was displaying stop but changed to approach before his engine reached it. The signal at BD Tower was at stop, but as he approached this tower the calling-on signal was displayed, authorizing him to enter the block, and he did so after operating the forestalling lever of the automatic

train stop device. He said he was working a light throttle when passing the calling-on signal and gradually opened the throttle and increased speed after passing that point, shutting off steam on reaching the curve, at which time the speed of his train was about 20 miles per hour. After passing the cars of train no. 90 which were on the eastward siding, he saw signal 212.2 at stop, thought this indication was being displayed because train no. 8 was in that particular block, and was preparing to stop at the signal, but when part way around the curve he saw the rear end of train no. 8 and the stop signals of the flagman, and he at once applied the brakes in emergency and opened the sanders. The brakes responded properly in emergency, and he was of the opinion that the speed of the train at the time of the collision was not more than 5 or 6 miles per hour, the damage which resulted being due to the run-in of the cars in his train. Engineman King was unable to estimate how far the flagman was located from the rear end of train no. 8. Engineman King further stated that he fully understood the signal indication he had received meant the track was obstructed and that he should be prepared to stop in the distance he could see, but he said that he followed train no. 8 regularly, had never known of its being delayed in any such manner as on the night of the accident, had seen the green markers of the freight train on the siding which indicated to him that it was into clear, and took it for granted that inasmuch as he had not been flagged, train no. 8 had kept on moving as was usually the case, and he was figuring on proceeding as far as signal 212.2 and stopping his train at that point, the thought not entering his mind that train no. 8 had stopped for

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the signal and that the signal was at stop because of some other movement being made. Engineman King freely admitted that he was rounding the curve at too high a rate of speed to enable him to stop within the distance he could see, but at the same time he expressed the opinion that the accident never would have happened had the flagman of train no. 8 gotton off when that train slowed down to pick up the flagman of the switch crew. These statements by Engineman King corroborated in most of its important details a signed statement made by him on the day following the accident. It further developed in the questioning of Engineman King that he understood that the signal indication he had received was even more restrictive than a slow-speed indication, which limits speed to 15 miles per hour, but at the joint investigation in which the Commission's representatives participated, and also at the coroner's inquest, he took the position that it required him to be under control prepared to stop within his range of vision, that he could see 80 or 100 car lengths, and that if he passed BD Tower at a speed as high as 65 miles per hour he still would be under control.

Fireman Arey, of train third no. 2, who was riding on the fireman's seat box all the way from the station to the point of accident, confirmed Engineman King's statements as to the signal indications displayed at Liberty Street and BD Towers. He estimated the speed to have been 15 miles per hour at Liberty Street and 20 miles per hour when passing BD Tower, with the speed increasing, and he said that the engineman continued to work a light throttle and that the speed was 20 or 25 miles per hour as the train approached the curve; the first knowledge he had of anything wrong was when the engineman applied the brakes in emergency and then stood up and closed the throttle. It was not until after the brakes had been applied that Fireman Arey saw the left marker of train no. 8, approximately 100 feet distant, and he thought that the speed of this train had been reduced to 15 or 18 miles per hour when the collision occurred; he thought the train ran a distance of only about 125 feet after the brakes were applied. At no time did Fireman Arey see the flagman. It also appeared from the fireman's statements that when his train stopped just west of signal 214.2, located 1,949 feet west of the center of the passenger station, he saw the markers of train no. 8 at the station displaying good red indications to the rear, and when that train was departing the markers still were burning properly, while at least the left marker was burning properly when he saw it just before the collision. Fireman Arey further stated that Engineman King appeared to be in normal physical condition, there having been nothing unusual in his actions at any point between Hornell and the point of accident.

Conductor Shea, of train third no. 2, estimated the speed at Liberty Street to have been 10 or 12 miles per hour, at BD Tower 15 or 18 miles per hour, and not over 25 per hour when the brakes were applied in emergency, the train running a distance of from five to seven car lengths after this application was made. It took him a minute or two to get straightened out in the coach after the accident, at which time he looked at his watch and it was then 7:24 p.m.; his watch was within 10 seconds of being correct when he compared time before leaving Hornell. Conductor Shea got out of the coach on the engineman's side, and on looking ahead he was unable to see what had

happened; he located the rear of his train at that time as being about four or five car lengths east of the cars in train no. 90 which were on the siding. Conductor Shea had known Engineman King for 25 or 30 years, and had worked with him for the past 5 years; he thought Engineman King appeared to be in normal physical condition when talking with him at Elmira, 58.7 miles from Binghamton, and had not noticed any irregularities in the handling of the train between Hornell and Binghamton.

Brakeman Angell, of train third no. 2, thought the speeds at the various points en route after leaving Binghamton were slightly higher than those estimated by the conductor, and that the speed at the time of the emergency application was between 25 and 30 miles per hour; about 3 minutes after the accident, he looked at his watch and it was then 7:26 p.m. After the accident the cars on the passing track were three or four car lengths west of the rear end of his train.

Flagman Friends, of train third no. 2, who was recording the detentions to his train, said he compared time before starting, found his watch was 35 seconds slow, and set it so that it showed correct time. According to his figures, it was 7:17 p.m. when the rear of his train passed Binghamton station, and 7:26 p.m. when he again looked at his watch about 2 or 3 minutes after the occurrence of the accident. On account of being engaged with his work, he did not pay any particular attention to the speed of his train but thought it might have been 25 miles per hour when the brakes were applied in emergency. His estimate as to the location of the rear end of his train after the accident with respect to the cars on the siding agreed with that of Brakeman Angell.

Operator Packer, on duty at Binghamton station, keeps a record of the arrival and departure of all trains; according to his record trains no. 8 and third no. 2, departed at 7:16 p.m. and 7:18 p.m., respectively.

Signalman Wixson, on duty at Liberty Street, said both trains passed his tower at a speed of about 15 miles per hour. The markers on the rear of train no. 8 were burning and displaying a good red indication to the rear. No record is kept at this tower of the times at which trains pass.

Signalman Mace, on duty at BD Tower, said that after train no. 90 went in on the siding, a proceed indication was displayed for the movement of the switch engine; when train no. 8 passed he was unable to say what indication it received, but the lever had been pulled and the indicator showed that the block from BD to signal 212.2 was clear; when train third no. 2 passed he gave it the calling-on signal, not being able to give it the high signal because the block was obstructed, as shown by the indicator. Signalman Mace also stated that it is the usual practice to give a train the calling-on signal in order to avoid blocking the Lackawanna track at Liberty Street, but he also said that unless otherwise instructed he would give a train a calling-on signal and permit it to close up on a train ahead even though it might not be long enough to block the Liberty Street crossing. According to the records at BD Tower, train no. 8 was by at 7:18 p.m. and train third no. 2 at 7:21 p.m. Both engines were working steam and each train was traveling at a speed of about 20 miles per hour; the markers on the rear of train no. 8 could be

Road Foreman of Engines McCarthy, whose duties include the examination and qualification of enginemen, said he had been a road foreman since 1917 and since that time had examined Engineman King periodically. In January, 1933, after a leave of absence in no way connected with ill health, Engineman King was given a physical examination by one of the company physicians, the chief surgeon subsequently notifying Road Foreman McCarthy that Engineman King was physically qualified to perform his duties as an engineman. Mr. McCarthy further stated that he had known Engineman King for 42 years and knew him to be a man who never used tobacco or intoxicating liquors. After Engineman King made application to be given the run referred to as the milk train, Mr. McCarthy examined him again, prior to his taking over the milk train about August 1, 1933, this examination having particular reference to his ability to operate high-speed trains and his knowledge of Westinghouse and New York air-brake equipment; this was because Engineman King had recently been in freight service. In addition, he also required Engineman King to make a trip on the milk train in order to familiarize himself with the work and then made a trip himself with Engineman King on the train in question, closely observing his operation of the air brakes and his observance of speed restrictions; he found him capable of performing his duties in a satisfactory manner. Subsequently he had opportunity to observe Engineman King's handling of the milk train on August 14 and of another train on August 15. It further appeared from Mr. McCarthy's statements that after arriving at the scene of the accident he interviewed Engineman King on the deck of the engine, asked him what signal indication he had received and what his understanding was as to how he was to proceed under such signal indications, and then asked him what caused the accident, to which Engineman King replied that he got too bold with the speed and could not stop when he saw the flagman and the rear end of train no. 8. Afterwards Mr. McCarthy made a thorough inspection and test of the automatic train-stop equipment on engine 2929, and found it to be in good working order. Mr. McCarthy further stated that train third no. 2 as made up on the night of the accident should have been stopped by an emergency application of the air brakes from a speed of 25 miles per hour within a distance of between 600 and 700 feet.

Trainmaster Murphy said that Flagman Morris had been a qualified flagman for 15 years and that he had periodically re-examined him on the rules. When questioned with respect to the performance of Flagman Morris, in so far as it related to the throwing off of a fusee when his train rounded the curve, Trainmaster Murphy said that a fusee should have been used.

Division Car Foreman Cregan, who arrived at the scene of the accident less than a hour after its occurrence, at which time none of the equipment had been moved, checked the position of the angle cocks and cut-out cocks on all the cars in train third no. 2 and found them in proper operating position. After cutting out the brake on the coach, a bad leak having developed in the inductor pipe, an air-brake test was made, Engineman King making a 30-pound reduction from a brake-pipe pressure of 110 pounds; the brakes on all cars were found in applied position except on the seventeenth

car in the train, the brake on which had leaked off; during this test the piston travel of each car was measured and recorded. The train line was then recharged and an emergency application made, the piston travel again being checked and it was found to be substantially as it was after the service application; again it was found that the brakes on the seventeenth car were not applied. The full service application was then repeated, particular attention being paid to the seventeenth car, and it was found that the brake remained applied about 1 minute and that the piston travel was 8 inches; this car had a leak around the cylinder gasket which in his opinion might have been a result of the collision, at which time there should have been emergency pressure in the cylinder. Leaving the coach and also the seventeenth car in the train out of consideration, the piston travel on the remaining 17 cars as shown by the test made by Mr. Cregan varied from 6 to 9 inches as to 14 cars; 2 had $5\frac{1}{2}$ inches of piston travel, and the other had piston travel of 11 inches. Examination was made of the brakes after the first and second tests for the purpose of ascertaining whether they were released, and it was found that all brakes tested had released. Mr. Cregan further stated that the damage to the express car, which was considered as destroyed, consisted of the buckling of the center sill and the loosening and breaking of the superstructure; the car had not been telescoped.

The equipment in train no. 8 which was materially damaged consisted of the sixth car, Erie steel-underframe coach 1037; the seventh car, Erie steel coach 2203; and the eighth car, Erie steel-underframe parlor car 984. According to detailed information furnished by Shop Superintendent Fitzgerald at Susquehanna, coach 1037, the rear end of which was telescoped by coach 2203 for a distance of 47 feet, was built in 1904, its length over the body end sills was 70 feet, and over the buffers it was 78 feet $3\frac{1}{4}$ inches; it was mounted on 6-wheel trucks; a steel underframe of the fish-belly type was applied in May, 1917, and the car had a total weight of 117,200 pounds and a seating capacity of 76. The vestibules and the platforms were of wooden construction, re-inforced, and were supported by the center-sill extension of the underframe and also by two I-beams extending from the end sill of the vestibule to the body bolster. Parlor car 984 was of similar construction, with different arrangement and equipment in the interior; the total weight of this car was 1,100 pounds more than that of coach 1037. Coach 2203 was an all-steel car built in 1907, with a length over the body end sills of 70 feet, and over the buffers of 80 feet 2 inches, mounted on 6-wheel trucks, and having a weight of 124,000 pounds and a seating capacity of 84. It will be noted that coach 2203 weighed 6,800 pounds more than coach 1037; of this extra weight, according to the figures furnished, 6,396 pounds was represented by the difference in weight of the trucks, leaving 404 pounds as representing the weight of the body of coach 2203 in excess of the body of coach 1037.

In connection with the close time of train no. 90 ahead of the arriving time of train no. 8 at Binghamton, and the subsequent movements of switch engine 78 which resulted in stopping train no. 8 at the point where the accident afterwards occurred, Superintendent Graves and General Yardmaster Reap stated that rule 86, relative to the clearing of superior trains by inferior trains, is not in effect in the territory between Hornell and Susquehanna, train

movements being governed by rule 251, which provides that "on portions of the road so specified on the time table, trains will run with the current of traffic by block signals whose indications will supersede time-table superiority", and it was pointed out that in the special instructions in the current time table it is provided that "trains operating in automatic block signal districts governed by telephone train order signals may run with the current of traffic, upon signal indication, which signal indication supersedes time table superiority." Telephone train order signals are located at frequent intervals throughout the territory in question; and reference is made to one of these telephone train-order signals in the first part of this report. Superintendent Graves interviewed Engineman King on his engine at the point of accident, and his statement concerning what Engineman King told him as to the cause of the accident is in line with the statement made by Road Foreman of Engines McCarthy. On the day following the accident, when Engineman King made the signed statement previously referred to, the chief surgeon was called in for the purpose of examining Engineman King, and of making sure that he was in the proper frame of mind to make the statement in question. It also appeared from the statements of Superintendent Graves that formerly the milk train was operated ahead of train no. 8, but on account of the work to be done there were occasions when the milk train would delay train no. 8, and it was decided to run train no. 8 ahead of the milk train. Mr. Reap also added the statement that he had never received any instructions oral or written about not making movements of the kind being made by switch engine 78 immediately preceding the occurrence of the accident.

On the night of September 11, a coach with markers was placed at the approximate point of accident, with cars on the siding representing the cars of train no. 90 which were on the siding when the accident occurred. Using the same type of engine as engine 2929, it was found that an engineman could have a clear view of the markers for a distance of over 1,300 feet. Engineman King, who was on the engine at the time of the test, said the cars on the siding were farther east on the night of the accident than on the night of the test, and he was therefore requested to take the engine, move it ahead, and spot it about where he thought he first saw the flagman and markers of train no. 8; he did so, and this point was found to place the front end of his engine about 600 feet from the rear of the test coach.

On the night of September 19, a test was made for the purpose of ascertaining how far a flagman could go back from the rear end of a coach representing train no. 8 in 45 seconds, 1 minute, 1 minute 15 seconds, and 1 minute 30 seconds. The car used in the test was not of the same type as the parlor car on the rear of train no. 8 on the night of the accident, and facilitated the movement of the flagman to some extent. At the time of making this test, Flagman Morris picked out a seat in the car about as far from the door as the seat in which he was riding on the night of the accident, and at the same time said that as his train stopped quickly on the night of the accident, it had made the stop by the time he had taken off his glasses and had gotten out of the seat. The timing of Flagman Morris' movements on the test, therefore, began with the flagman

standing in the aisle of the car facing the rear and ready to start for the closed rear door of the coach; it was found that within the periods of time above mentioned, he got back 346, 462, 576, and 671 feet, respectively. While standing at the latter point, Flagman Morris said he was satisfied he did not get back that far on the night of the accident, and after looking over the ground he finally picked out a spot which he thought represented his approximate location on the night of the accident, which was at a point 415 feet from the rear of the test coach.

Conclusions

This accident was caused primarily by the failure of Engineman King, of train third no. 2, properly to obey a signal indication which required him to proceed prepared to stop short of a train, obstruction or anything that might require the speed of his train to be reduced.

According to Engineman King's statements, he stopped behind train no. 8 while the latter train was standing at the station at Binghamton and then followed it closely from that point. The home signal indication at Liberty Street Tower changed from stop to approach before his engine reached it and he then forestalled and proceeded toward BD Tower, where the home signal was in stop position; he received a calling-on signal indication, however, which told him that the block he was about to enter was occupied or otherwise obstructed, and which also authorized him to enter that obstructed block at restricted speed, which is defined in the book of rules as follows:

> "Proceed prepared to stop short of train, obstruction, or anything that may require the speed of a train to be reduced."

He again operated the forestalling lever, after which he entered the obstructed block, working a light throttle, and according to his statements he gradually opened the throttle and increased the speed of his train until he had about reached the curve west of the point of accident. He said he shut off at this point, although the fireman's statement is to the contrary, but in any event he saw signal 212.2 displaying a stop indication and assumed thatthis indication was displayed because train no. 8 had passed into the block governed by that signal, the thought not entering his mind that the signal might be at stop because of some other movement being made. The result was that he was proceeding with the expectation of not stopping until he reached the signal location, and it was due to this fact that when he finally saw the flagman and markers of train no. 8 between him and the signal he was going at too high speed to enable him to stop. He knew what the indication of the calling-on signal meant, but he allowed himself to be misled by what he assumed was the case instead of operating his train strictly in accordance with the signal indications he had received and the rules governing the same.

His statement indicating that the fact he had not been properly flagged contributed to his misunderstanding of the situation, is further evidence that he was not governing his actions strictly in accordance with the rules. Furthermore, the conductor who was deadheading on train no. 8 looked back after the accident and was able to see lanterns at the rear end of train third no. 2, indicating that there was nothing to obstruct his view for at least the length of that train, a distance of more than 900 feet; this statement was confirmed by the statements of the three employees who were in the coach on the rear of train third no. 2 to the effect that after the accident the coach was several car lengths east of the cars of train no. 90 which were on the siding. Under these circumstances, it is clear that Engineman King could have seen the rear end of the preceding train at a distance which would have enabled him to stop from the rate of speed at which his train was moving, and it therefore becomes apparent that he not only failed to operate his train at restricted speed as defined in the rules while passing the cars on the siding, but that he also failed to maintain a proper lookout after passing those cars.

The evidence shows clearly that these two trains were running under close headway and that this fact was known by the crew of each train. Trains under close headway can be operated in safety, but it requires strict observance of the rules on the part of everyone concerned. In this case there was not that strict observance of rules which was absolutely necessary under the circumstances. Train no. 8 had been moving for a considerable distance at a reduced rate of speed, and then had started around a curve where the view to be had by the engineman of the following train was cut off up to a certain point by cars standing on a siding on the inside of the curve; in addition, the train had reduced speed sufficiently to pick up a flagman, and then had moved ahead approximately its own length before finally coming to a stop. Clearly, this train was moving under circumstances in which it was apt to be overtaken by a following train within the meaning of the last portion of rule 99, which on this railroad is the standard code rule and reads in part as follows:

> "When a train is moving under circumstances in which it may be overtaken by another train, the flagman must take such action as may be necessary to insure full protection. By night, or by day when the view is obscured, lighted fusees must be thrown off at proper intervals.

"When day signals cannot be plainly seen, owing to weather or other conditions, night signals must also be used. Conductors and enginemen are responsible for the protection of their trains".

The amount of time available after train no. 8 stopped was not sufficient to enable Flagman Morris to provide full protection, but before his train stopped it was moving under circumstances which should have prompted him to throw off a fusee, and this should have been done at the end of the long tangent west of the curve; he had the necessary equipment at hand and instead of continuing with his clerical duties inside the parlor car he should have been out on the rear platform, at least by the time his train picked up the flagman.

The action of Engineman Grantier, of train no. 8, in neglecting to whistle out a flag when he picked up the flagman of the switch crew, is subject to criticism. His train had been running slowly for a considerable distance, and after being flagged and having been told by the flagman what was being done, he should have realized that his train was going to be delayed for a few minutes. Under these conditions good judgment should have prompted him to whistle out a flag at that time instead of waiting until he had pulled ahead approximately the length of his train.

Conductor Burlingame, of train no. 8, also knew that his train was being operated at reduced speed. As conductor it was his duty to see to it that full protection was afforded against a following train; instead of attending to this important duty, however, he failed to give any attention to the matter until after his train had stopped.

Rule 875 of the rules of the operating department, relative to the duties of firemen, reads as follows:

"He must, when necessary, protect the train. If engineman fails, through disability, to regulate speed of train when approaching a signal indication or other condition requiring that speed be reduced, he must communicate with him at once, and, if necessary, stop the train."

In the case at hand the engineman was not disabled, and under such circumstances Fireman Arey, of train third no. 2, was not required to take charge of the engine in any way. However, he knew what signal indications had been received and having had 20 years' experience in engine service and having been promoted 14 years ago, it is a matter worthy of comment that it did not occur to him to cross over to the right side of the engine where he could have seen what was going on ahead of his train.

Rule 93 of the rules of the operating department reads in part as follows:

"Within yard limits the main track may be used, protecting against first class trains."

This rule, taken in conjunction with rule 251 and the special instructions in the time-table referred to earlier in this report, makes it clear that so far as the rules were concerned, it was permissible to send switch engine 78 to the east end of BD siding, there to deliver cars to train no. 90 and then pick up the cars to be set out from that train, even though the movements involved would be on close time ahead of train no. 8 and might reasonably have been expected to result in delay to that train. There was some evidence which indicated that operations of this character were not of infrequent occurrence. The practice of using the main line for switching operations on the time of important passenger trains is open to criticism; it does not appear that there was any necessity for the switching operations ahead of train no. 8 in this case, which set the stage for the subsequent occurrences which resulted in this accident. Operating officers of railroads are assuming a grave responsibility for which no excuse can be found, when they authorize movements of this kind.

The cars in train no. 8 were of steel and steel-underframe construction. Damage to the rear or eighth car, which was of steel-underframe construction, was relatively small, and the fifth car, also of steel-underframe construction, was practically undamaged. However, the sixth car, coach 1037, which was of the same type of construction, was practically destroyed, and it was in this car that nearly all of the casualties occurred. The underframe of this car did not fail, but the seventh car, which was a steel car, overrode the underframe and floor of the sixth car and telescoped its superstructure for about two-thirds of its length. The sixth and eighth cars were built in 1904 and steel underframes were applied in 1917 and 1916, respectively. Coach 1037 came through in the train from Chicago, and 11 out of the 14 persons killed in this car were either employees of the Erie Railroad Company or employee dependents, the large majority of whom resided in Susquehanna, Pa., a division terminal located 22.5 miles east of Binghamton.

Under the circumstances in this case there does not appear any reason why Signalman Mace, on duty at BD Tower, should not have displayed the calling-on signal authorizing train third no. 2 to enter an obstructed block. Not only is it necessary in many cases that trains be advanced at BD Tower in order to avoid having the rear of a train block the interlocking plant at Liberty Street, but it also is to

be remembered that the calling-on signal was installed for the particular purpose for which it was used on this occasion; it is necessary in the operation of a railroad to keep interlocking plants clear of traffic in order that they may be free to perform their proper function, and the present case constitutes no exception to the usual practice throughout the country.

The track in the vicinity of the point of accident and the engines of the trains involved in this accident were equipped with automatic train-stop devices and investigation revealed that the automatic train-stop apparatus was in proper condition to function as intended. The engineman of train third no. 2 operated the forestalling device on his engine when approaching BD Tower, where the proceed indication of the calling-on signal was displayed for his train. Operation of this forestalling device prevented an application of the brakes by the automatic train-stop apparatus; the operation of this device also was an acknowledgment by the engineman that he recognized the fact that his train was entering an occupied or obstructed block; under the restricted-speed signal it was then incumbent upon him to control the speed of his train so as to be able to stop short of the preceding train or any other obstruction.

The record of this case does not do credit to the Erie Railroad, for there have been too many employees who failed in one way or another to perform their duties to the fullest possible extent. Such a situation is a reflection on those responsible for the proper functioning of the operating department and justifies the recommendation that greater efforts should be made in the way of instruction and supervision.

Engineman King was employed as a fireman in 1891, and promoted to engineman in 1902; he qualified for passenger service in 1914. At the time of the accident, he had been on duty about 4 hours, previous to which he had been off duty 44½ hours. All of the other employees on the various trains involved were experienced men, and none of them had been on duty in violation of any of the provisions of the hours of service law.

Respectfully submitted,

W. P. BORLAND,

Director.